X85™ X75™

Multiple Path Converters and Frame Synchronizers

Installation and Operation Manual

Edition J
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X85-3G/X85HD/X75SD

Multiple Path Converters and Frame Synchronizers

Installation and Operation Manual

Edition J
December 2009

Trademarks and Copyrights

Warranty Information

The Limited Warranty Policy provides a complete description of your warranty coverage, limitations, and exclusions, as well as procedures for obtaining warranty service. To view the complete warranty, visit our website.

This publication is provided “as is” without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, or non-infringement.

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Preface

Manual Information

Purpose and Audience

This manual details the features, installation procedures, operational procedures, and specifications of the X85-3G/X85HD/X75SD Multiple Path Converters and Frame Synchronizers. It is written for engineers, technicians, and operators responsible for the installation, setup, and/or operation of the product.

Revision History

Table P-1. Manual Revision History

Edition	Date	Details
Preliminary	December 2004	Preliminary release
A	January 2005	Initial release
B	April 2005	Addition of SD capabilities, new packages, options, and index
C	June 2005	Addition of X75OPT-HDDUOCON option, software upgrade procedures, and alarms list
D	March 2006	Addition of streaming and video/audio timing options, improved alarms list, specifications and features changes
E	July 2006	Addition of 32-channel audio information
F	February 2007	Addition of Dolby® encoding hardware and software
G	August 2007	Addition of logo generator, I-wings, HD Processing Bypass mode, color correction, Active Frame Description, audio metadata, and DVB Teletext Captioning
H	October 2008	Addition of new color correction and AC-3 Dolby encoding
I	February 2009	Addition of X85HD capability
J	December 2009	Addition of DTS Neural audio options

Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

Table P-2. Writing Conventions

Term or Convention	Description
Bold	Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names
Italics	Indicates email addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis
CAPS	Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE
`Code`	Indicates variables or command-line entries, such as a DOS entry or something you type into a field
>	Indicates the direction of navigation through a hierarchy of menus and windows
hyperlink	Indicates a jump to another location within the electronic document or elsewhere
Internet address	Indicates a jump to a Web site or URL
Note	Indicates important information that helps to avoid and troubleshoot problems

Unpacking/Shipping Information

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free service.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

Product Servicing

Except for the installation of modules and firmware upgrades, X75 and X85 products are not designed for field service. For repairs and modifications that are not described in this manual, contact Customer Service at the number listed on the back cover.

Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product’s weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing.

Safety Terms and Symbols

Terms and Symbols Used in this Manual



WARNING statements and icons identify conditions or practices that can result in personal injury or loss of life. High voltage is present. Uninsulated dangerous voltage within the product's enclosure may be sufficient to constitute a risk of electric shock to persons.



CAUTION statements and icons identify conditions or practices that can result in damage to the equipment or other property. Important operating and maintenance (servicing) instructions are included in the literature accompanying the product.

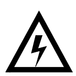


CAUTION statements and icons identify conditions or practices that can result in damage to the equipment or other property if proper care during use and transport is not taken.

Terms and Symbols Found on the Product



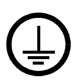
DANGER: Indicates a hazard for high voltage, fire, or personal injury immediately accessible as one reads the marking



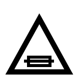
WARNING: Indicates a personal injury hazard not immediately accessible as one reads the marking



CAUTION: Indicates a hazard to property, including the product, or the need to take attention and refer to the manual



Protective ground (earth) terminal



FUSE: Replace with same type and rating of fuse



Observe precautions for handling electrostatic-sensitive devices

Third-Party Software Licensing Agreement

If the software embedded in this product incorporates the VxWorks Run-Time Module, the following paragraphs are applicable:

You are prohibited from:

a) copying the Run-Time Module, except for archive purposes consistent with your archive procedures;

b) transferring the Run-Time Module to a third party apart from the product containing the Run-Time Module;

c) modifying, decompiling, disassembling, reverse engineering or otherwise attempting to derive the source code of the Run-Time Module;

d) exporting the Run-Time Module of underlying technology in contravention of applicable U.S. and foreign export laws and regulations, and

e) using the Run-Time Module other than in connection with operation of the product in which it is embedded.

Any further distribution of the Run-Time Module is subject to the same restrictions set forth herein. Wind River Systems, Inc. and its licensors are third party beneficiaries of the End User License Agreement and the provisions related to the Run-Time Module are made expressly for the benefit of, and are enforceable by, Wind River Systems, Inc. and its licensors.

The laws of the Province of Ontario shall govern this Agreement. Updated 2007.

Chapter 1

Introduction

Overview

The Harris X85-3G/X85HD/X75SD series includes standard and high-definition utility synchronizers and converters that combine video and audio processing with the ability to upconvert, downconvert, and crossconvert from most common input and output video formats.

Models are available in 3G HD-SDI, 1.5G HD-SDI, SD-SDI, and DPS-575-compatible versions—well-suited for hybrid facilities, and the ideal choice for broadcasters making the transition to digital, 1.5G high-definition, and 3G HDTV. Available in video-only and audio/video configurations, the X85 and X75 provide a bridge between analog, digital, and high-definition systems with analog, digital, and embedded audio.

NOTE

This manual describes the operation of both X85 and X75 products. Some functions of the X75HD module may differ from those described in this manual when new firmware is added.

From a functional standpoint, the X85HD module incorporates more inputs and outputs, and unlike the X75HD module, the X85HD module processes both SD and HD signals. Because of this, X85HD parameter names often include the term **SDI** to indicate functions that operate through the X85HD module, where the X75HD parameters would include the term **HD**. Parameter names that include **SD** indicate functions that operate through the main processing module of the frame. See the “Video Functional Block Diagram” on page 42 for more information.

This chapter describes the main features and applications, under the following topics:

General Description

Offering unparalleled flexibility, the X85-3G/X85HD/X75SD product line provides up to nine video inputs and ten video output formats, depending upon the following available options:

- Two HDTV optical fiber serial component digital video inputs and outputs (X85) or one HDTV optical fiber serial component digital video input and output (X75)
- Two HDTV coaxial inputs and outputs on independent paths (X85) or two HDTV coaxial inputs and outputs using the same path (X75)
- Two SD-SDI serial component digital video inputs and outputs
- One 128 x 96 thumbnail streaming source and one 352 x 240 pixel (525) or 352 x 288 pixel (625) streaming-over-IP video/audio output
- Component analog video (Betacam®) input and output
- S-video (S-VHS/Hi8) input and output
- NTSC/PAL-M/PAL-B/SECAM composite video input and output
- RGB-S output
- DVI-D output

See page 57 for descriptions of some typical applications using these options, and "Product Packages" on page 9 for more specific information on what each X85-3G/X85HD/X75SD system package provides.

Inputs

Inputs are capable of auto-detection, with user-selectable SMART alarms. Two input modes (both of which allow for either automatic detection or user-selection of inputs) are available for processing critical program paths for ingest, and bridging between routers/tape transports/servers, mobile broadcast, and edit suites.

Video Processing

Processing for video includes level/color control, aspect ratio conversion, 3D-adaptive color decoding, noise reduction, frame synchronization and time base correction for non-synchronous signals, analog-to-digital and digital-to-analog video conversion.

Other capabilities include the following:

- Up and down conversion
- Aspect ratio control
- High-definition cross-conversion

Audio Processing

Processing for audio includes level control, analog-to-digital and digital-to-analog conversion, and SD-SDI and HD-SDI serial digital signal embedding and de-embedding.

Other capabilities include the following:

- Sample rate conversions, synchronization, and timing-to-video for correction of lip sync errors
- Embedding/de-embedding of signals such as Dolby E™ and AC-3™
- Processing of multiple channel program signals for surround-sound applications before or after compression
- Audio-follow-video routing
- Converting, adjusting, timing, demultiplexing, and multiplexing

Signal Control and Monitoring

You can control and monitor signals using a variety of methods:

- Local X85-3G/X85HD/X75SD control panels
- Remote X75-RCP control panels
- Web server software
- Local DPS-575 control panels
- Remote RC-575 control panels
- CCS™-enabled hardware controls
- CCS software applications and QuickTime Player
- SNMP control systems

Operating Modes

The X85 and X75 have four main operational modes:

- Auto Detect (default mode)
- M-Path (multiple path)
- Simulcast
- All Output Select

In addition, the X85 also provides a Program Delay mode.

See page 43 for more information on modes of operation.

Main Features

The following standard and optional features are described in this document:

X75 and X85 General Functionality

- Upgradability from SDTV to HDTV, and HDTV to 3 Gb/s
- Frame syncs for analog, SDTV and HDTV
- Upconversion, downconversion, crossconversion, and aspect ratio conversion
- Analog-to-digital conversion
- Digital-to-analog conversion
- Proc amps for analog, SDTV and HDTV
- Video test generation
- Optional video noise reduction and enhancement
- Optional HD and SD color correction
- 8, 16, or 32 channels of internal audio processing (gain, invert, swap, sync/delay, sum)
- Embedding and de-embedding for SD-SDI, HD-SDI, and 3 Gb/s
- Compressed audio capability (Dolby E® and AC-3®)
- Video and audio timing correction
- Streaming video capability
- SD memory card parameter settings storage
- Audio (and embedded) test generation
- Audio limiting capability
- Built-in Web server with thumbnail monitoring capability
- Available redundant power supply
- Active Format Description (AFD), audio metadata, closed captioning, and DVB Teletext captioning capabilities
- Optional program delay for video and embedded audio

Input/Outputs

- Auto-detected inputs
- Two SD-SDI and two HD-SDI inputs
- Color black, tri-level sync and DARS reference inputs
- Optional NTSC/PAL-M/PAL-B/SECAM input with CAV and S-video inputs
- Ability to provide many outputs, including composite, component, SD-SDI, HD-SDI, HDTV fiber, DVI-D, and S-video
- SC and optional FC/ST fiber interface for HD-SDI (X75OPT-HDUPG HDTV module) or LC/SFP connectors for SD/HD-SDI (X85OPT-HDUPG HDTV module)
- Two, five, or eight AES inputs and outputs, at 75Ω or 110Ω
- Four analog audio inputs and outputs
- GPI inputs and outputs

Operation, Control, and Monitoring

- Four operating modes in the X85 products, three in the X75 products
- Local and remote control panels
- Control for up to 200+ units from a single control panel
- X75 Web server software application
- Software GUI control and monitoring using CCS Navigator
- SNMP and third-party interfaces
- *SMART* alarms (global parameters for all inputs—allowing custom-definitions for how and when alarms are activated, including priority settings for main and backup inputs)

Hardware Features

- SD (Secure Digital) removable media for storage of parameter settings; 128 MB included (the maximum size supported by the X85/X75 is 2 GB)
- Front-to-back air flow
- Single and dual redundant power supplies

X85 Additional Features

- 3 Gb/s capability
- Profanity avoidance option (Program Delay)
- V2A functionality for 3Gb/s

NOTE

A free trial version of CCS Navigator is packaged with each new X85-3G/X85HD/X75SD order. After the trial period, the program retains only Discovery and code update capabilities if the full program is not purchased. Most features described in this manual continue to operate using early versions of CCS Pilot and Navigator software.

Front and Rear Panels

X85 and X75 have slightly different front and back panel appearances. Descriptions of the individual processing modules, begin on page 15. For typical control configurations, see page 33.

X85-3G/X85HD/X75SD units with a blank front panel, must be configured and controlled remotely, using one of the following methods:

- Separate control panel such as an X75-RCP
- Local control panel on an X85-3G/X85HD/X75SD or DPS-575
- CCS applications such as Pilot or Navigator
- Web server application using a common Web browser such as Internet Explorer™ or Netscape™
- SNMP (Simple Network Management Protocol) and third-party control software offered through CCS Protocol

Blank front panels provide LEDs for alarm and status monitoring, (including major and minor alarm LEDs), and status LEDs for power and memory access.

NOTE

DPS-575 units do not have the **Ctrl** button found on X85-3G/X85HD/X75SD models. Button shortcuts on X85-3G/X85HD/X75SD models that require the **Ctrl** button are not accessible remotely via a DPS-575 unit. In these cases, the affected parameters must be accessed through the menu structure.

Local and remote control panels contain LEDs that indicate alarm, status, and configuration information.

Product Packages

X75HD/X75SD models are available in a wide range of product packages, and with a large number of options for modules, connectors, cables, and software. All of the frames described in the next pages are capable of single-channel up, down, and cross conversion.

Table 1-1 describes the various X85 and X75 product packages and options that you can order. Some options are installed in the factory at the time of purchase, while other options and upgrades can be ordered and installed at a later time. The X75OPT-HDDUOCON software key option is required for simultaneous up, down, and cross conversion.

For further information about the cables described in this table, see "Cables and Pinouts" in Chapter A, page 263

Table 1-1. X85 and X75 Options and Packages

Item Number	Description
DPS-575 Equivalent Models with Extras	
X75-DPS-575	X75SD Equivalent to DPS-575: 1RU Digital Synchronizer, Video Only, Local Control Panel, includes X75OPT-A3D Analog Video input
X75-DPS-575LC	X75SD Equivalent to DPS-575LC, 1RU Digital Synchronizer, video only, no control panel, includes X75OPT-A3D analog video input
X75-DPS-575AV	X75SD Equivalent to DPS-575AV, 1RU Digital Synchronizer, video and 8-channel audio, local control panel, includes X75OPT-A3D analog video input
X75-DPS-575LCAV	X75SD Equivalent to DPS-575LCAV, 1RU Digital Synchronizer, video and 8-channel audio, no control panel, includes X75OPT-A3D analog video input
X75SD Digital Standard Definition	
X75SD	1RU Digital Synchronizer, Video Only, Local Control Panel
X75SD-LC	1RU Digital Synchronizer, Video Only, No Control Panel
X75SD-AV	1RU Digital Synchronizer, Video and 8 Channel Audio, Local Control Panel
X75SD-LCAV	1RU Digital Synchronizer, Video and 8 Channel Audio, No Control Panel
X75SD Digital Standard Definition and Redundant Power Supply	
X75SD-2PS	1RU Digital Synchronizer, Video Only, Local Control Panel, Redundant Power Supply
X75SD-LC-2PS	1RU Digital Synchronizer, Video Only, No Control Panel, Redundant Power Supply

Table 1-1. X85 and X75 Options and Packages *(Continued)*

Item Number	Description
X75SD-AV-2PS	1RU Digital Synchronizer, Video and 8 Channel Audio, Local Control Panel, Redundant Power Supply
X75SD-LCAV-2PS	1RU Digital Synchronizer, video and 8-channel audio, no control panel, redundant power supply
X85 with Dual Up, Down, Cross Conversion	
X85HD	1RU Up/Down/Cross Converter & Synchronizer, Video Only, Local Control Panel (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required
X85HD-LC	1RU Up/Down/Cross Converter & Synchronizer, Video Only, No Control Panel (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required
X85HD-AV	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, Local Control Panel (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required
X85HD-LCAV	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, No Control Panel (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required
X85 with Dual Up, Down, Cross Conversion, Redundant PSU	
X85HD-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video Only, Local Control Panel, Redundant Power Supply (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required
X85HD-LC-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video Only, No Control Panel, Redundant Power Supply (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required
X85HD-AV-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, Local Control Panel, Redundant Power Supply (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required
X85HD-LCAV-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, No Control Panel, Redundant Power Supply (Dual Channel .27/1.5 Gb/s Conversion), for 3.0 Gb/s capability, the X85OPT-3G software key option is required

Table 1-1. X85 and X75 Options and Packages *(Continued)*

Item Number	Description
X85-3G with Dual Channel Up, Down, Cross Conversion	
X85-3G	1RU Up/Down/Cross Converter & Synchronizer, Video Only, Local Control Panel (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85-3G-LC	1RU Up/Down/Cross Converter & Synchronizer, Video Only, No Control Panel (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85-3G-AV	1RU Up/Down/Cross Converter & Synchronizer, Video and 32 Channel Audio, Local Control Panel (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85-3G-LCAV	1RU Up/Down/Cross Converter & Synchronizer, Video and 32 Channel Audio, No Control Panel (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85-3G with Dual Channel UP, Down, Cross Conversion, Redundant PSU	
X85-3G-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video Only, Local Control Panel, Redundant Power Supply (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85-3G-LC-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video Only, No Control Panel, Redundant Power Supply (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85-3G-AV-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video and 32 Channel Audio, Local Control Panel, Redundant Power Supply (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85-3G-LCAV-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video and 32 Channel Audio, No Control Panel, Redundant Power Supply (Dual Channel .27/1.5/3.0 Gb/s Conversion), X85OPT-3G option is included
X85 Hardware Options (may not be used in X75)	
X85OPTPD-2	Program Delay Software Key License (up to approximately 27 seconds for .27 Gb/s, 10 seconds for 1.5 Gb/s, 5 seconds for 3.0 Gb/s), requires X85OPT-M2 Memory Module
X85OPTPD-2-M2	Program Delay Software Key License (up to approximately 27 seconds for .27 Gb/s, 10 seconds for 1.5 Gb/s, 5 seconds for 3.0 Gb/s), includes X85OPT-M2 Memory Module
X85OPTSC-SD	SD-to-SD Standards Conversion Software Key License; requires the X85OPTPD-2-M2 program delay feature
X85OPTSC-HD	HD/SD-to-HD/SD Standards Conversion Software Key License; requires the X85OPTPD-2-M2 program delay feature

Table 1-1. X85 and X75 Options and Packages *(Continued)*

Item Number	Description
X85OPTSC-SD-M2	SD-to-SD Standards Conversion Software Key License; includes X85OPT-M2 Memory Module
X85OPTSC-HD-M2	HD/SD-to-HD/SD Standards Conversion Software Key License; includes X85OPT-M2 Memory Module
X85 Optical Fiber Options (may not be used in X75)	
SFP+RR	Field Retrofit Fiber Receiver, dual inputs, standard sensitivity
SFP+TT+13+13L	Field Retrofit Fiber Transmitter, dual outputs, 1310nm FP lasers
X85 Software Key (may not be used in X75)	
X85OPT-3G	3.0 Gb/s Input and Output option
X85OPT-CC	Color Correction Software Key Option for X85 - one SD and two SD/HD/3G color correctors, (for 3G, the X85-3G model or X85HD model with the X85OPT-3G software key is required)
X75 Hardware Options (may be used in X85)	
X85OPT-HDUPG	HDTV submodule with Dual Auto Detected 270/1.5/3.0 Inputs and Dual 1.5/3.0 Output and Dual Up, Down or Cross Conversion, Coax and Optional Optical Input and Output, for 3.0 Gb/s operation, the X75OPT-3G software key license is required
X75OPT-A3D	Analog Video Input with high performance 3D fully-adaptive comb filtering, S-Video and analog component Betacam inputs
X75OPT-A3D-1	Analog Video Input with Industry-Leading 3D fully-adaptive comb filtering, S-Video and analog component Betacam inputs (with alternate color decoder algorithm)
X75OPT-AS-32	32 Ch. Audio Synchronizer with 8 AES / SD & HD 4 Group Embedded Inputs and Outputs, Includes Cable Set
X75OPT-AS-32-L	32 Ch. Audio Synchronizer with 8 AES / SD & HD 4 Group Embedded Inputs and Outputs with Audio Limiting, Includes Cable Set
X75OPT-AS-16	16 Ch. Audio Synchronizer with 4 Ch. Analog / 5 AES / SD & HD 4 Group Embedded Inputs and Outputs, Includes Cable Set
X75OPT-AS-16-L	16 Ch. Audio Synchronizer with 4 Ch. Analog / 5 AES / SD & HD 4 Group Embedded Inputs and Outputs with Audio Limiting, Includes Cable Set
X75OPT-AS-8	8 Ch. Audio Synchronizer with 4 Ch. Analog / 2 AES / SD & HD 2 Group Embedded Inputs and Outputs

Table 1-1. X85 and X75 Options and Packages *(Continued)*

Item Number	Description
X75OPT-AS-8-L	8 Ch. Audio Synchronizer with 4 Ch. Analog / 2 AES / SD & HD 2 Group Embedded Inputs and Outputs with Audio Limiting
X75OPT-DOLBY-1	Dolby E and Digital (AC-3) Integrated decompression
X75OPT-DOLBY-2	Dolby E Integrated compression (call for details, fits new X75 units only)
X75OPT-DOLBY-3	Dolby Digital (AC-3) Integrated compression (call for details, fits new X75 units only)
X75OPT-DM	DTS Neural Surround™ DownMix DTV 5.1 transport solution
X75OPT-DM-LC	DTS Neural Surround™ DownMix DTV 5.1 transport solution with DTS Neural Loudness Control
X75OPT-LC	DTS Neural Loudness Control for 2.0 or 5.1 program audio
X75OPT-LC-6+2	DTS Loudness Control for 2.0 and 5.1 (separate programs)
X75OPT-LC-8	DTS Loudness Control for 4 x 2.0 program audio
X75OPT-LC+DM	DTS Loudness Control for 5.1 program audio with DTS Neural Surround™ Downmix output
X75OPT-MM	DTS Neural Surround™ 5.1 and rendered stereo content transitioning for DTV 5.1 production
X75OPT-MM-LC	DTS Neural Surround™ 5.1 and rendered stereo content transitioning for DTV 5.1 production with DTS Neural Loudness Control
X75OPT-UM	DTS Neural Surround™ UpMix DTV 5.1 production solution
X75OPT-UM-LC	DTS Neural Surround™ UpMix DTV 5.1 production solution with DTS Neural Loudness Control
X85-RCP	Remote Control Panel for X75, X85 and DPS-575
X75OPT-PS	Power Supply Field Retrofit Kit
X75OPT-STR	MPEG4 Monitor Streaming option (field retrofit for units with serial numbers higher than LHTI0240085001)
X75OPT-LCP	Field Retrofit Kit (change a blank panel to a Local Control Panel) for X75
X85OPT-LCP	Field Retrofit Kit (change a blank panel to a Local Control Panel) for X85
X75 Hardware Options (may not be used in X85)	
X75OPTFIBER-FC	FC type fiber connectors for HD submodule
X75OPTFIBER-ST	ST type fiber connectors for HD submodule

Table 1-1. X85 and X75 Options and Packages *(Continued)*

Item Number	Description
X75 Software Options (may be used in X85)	
X75OPT-NR	Motion Adaptive Noise Reduction and Bandwidth Filtering for SDTV input signals
X75OPT-ASL	Audio Limiting Software Keyable Option
X75OPT-SNMP	SNMP Agent Software Keyable Option
X75OPT-V2A	Video/Audio Timing Tool Software Keyable Option for Receiving Units, any updated X75 generates the test signal
X75 Software Options (may not be used in X85)	
X75OPT-HDDUOCON	Optional Software Key, adds simultaneous Up and Down, or adds simultaneous Cross and Down conversions to X75HD models
X75OPT-SD-CC	Color Correction Software Key Option for X75 (one SD color corrector)
X75OPT-HD-CC	Color Correction Software Key Option for X75 (one HD color corrector)
Optional Cables (for X75 and X85)	
X75OPTCAB-8-C	Cable Set for 8 Ch. Audio Synchronizer, Unbalanced Coax AES (one set included)
X75OPTCAB-8-CX	Cable Set for 8 Ch. Audio Synchronizer, Unbalanced Coax AES and Balanced XLR AES
X75OPTCAB-8-X	Cable Set for 8 Ch. Audio Synchronizer, Balanced XLR AES
X75OPTCAB-16-C	Cable Set for 16 Ch. Audio Synchronizer, Unbalanced Coax AES (one set included)
X75OPTCAB-16-CX	Cable Set for 16 Ch. Audio Synchronizer, Unbalanced Coax AES and Balanced XLR AES
X75OPTCAB-16-X	Cable Set for 16 Ch. Audio Synchronizer, Balanced XLR AES
X75OPTCAB-32-C	Cable Set for 32 Ch. Audio Synchronizer, Unbalanced Coax AES (one set included)
X75OPTCAB-32-CX	Cable Set for 32 Ch. Audio Synchronizer, Unbalanced Coax AES and Balanced XLR AES
X75OPTCAB-32-X	Cable Set for 32 Ch. Audio Synchronizer, Balanced XLR AES
X75OPTCAB-DVI	Cable for DVI-D Single Link Output
X75OPTCAB-MULTI	Cable Set for Multi IO Connector

Front and Back Modules

The X85/X75 is available with a wide variety of module combinations. The following topics are included in this section:

X75OPT-AS-32 /X75OPT-AS-16 /X75OPT-AS-8 Audio Modules

General Description

The X75OPT-AS-16/8 audio modules and associated back panels provide 5 or 2 AES inputs and outputs, respectively, one DARS input, a four-channel analog audio input, and a four-channel analog audio output.

The X75OPT-AS-32 provides 8 AES inputs and outputs, in SD-SDI and HD-SDI.

Using these modules, the X75HD/X75SD can process, embed, and de-embed either 32, 16, or 8 channels of audio from/to SDTV and from/to HDTV. The back panels for these modules are located in the top, left corner of the frame, above the SDTV video connectors.

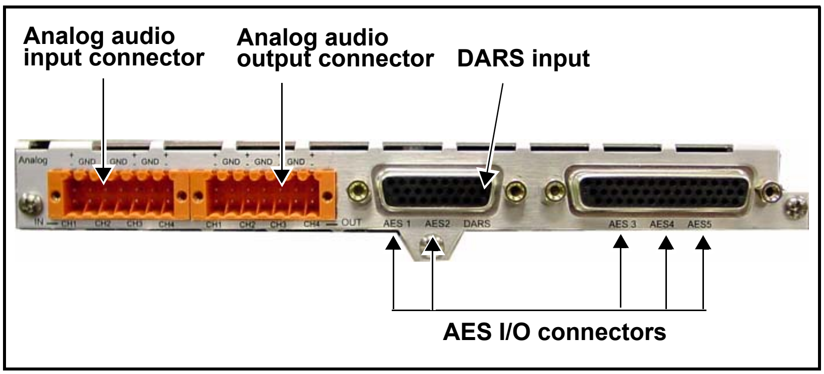


Figure 1-1. X75OPT-AS-16/X75OPT-AS-8 Back Panel

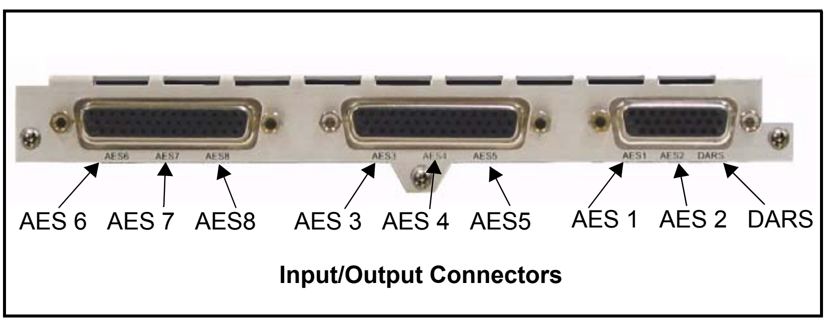


Figure 1-2. X75OPT-AS-32 Back Panel

This module provides all audio processing for the X85/X75 and is required to access, configure, and enable audio parameters in the **Audio Setup** submenu (accessed from the main menu). Adjustable options include gain, delay, tone, mute, voice-over, and AFV (audio follow video).

Required Jumper Settings and Local Configuration

Setting Jumpers

To configure the impedances of analog audio inputs and outputs on the X75OPT-AS-16 and X75OPT-AS-8 modules, you must set specific jumpers. The X75OPT-AS-32 does not require jumper settings.

Jumpers **1** through **12** are located at the rear of the X75OPT-AS-16 and X75OPT-AS-8 modules. Figure 1-3 on page 19 shows the location of the jumpers. See Table 1-2 for the correct placement of the jumpers. The white triangle next to each jumper indicates pin 1.

Table 1-2. Analog Audio Input and Output Impedance Jumper Settings (X75OPT-AS-16 and X75OPT-AS-8 modules)

Input Settings				
Input Number	**Jumper Numbers**	**Channel**	**Pin Numbers**	**Setting**
1	J5	Left (1A)	1 and 2	600Ω
			2 and 3	100kΩ
2	J6	Right (1B)	1 and 2	600Ω
			2 and 3	100kΩ
3	J7	Left (2A)	1 and 2	600Ω
			2 and 3	100kΩ
4	J8	Right (2B)	1 and 2	600Ω
			2 and 3	100kΩ
Output Settings				
Output Number	**Jumper Numbers**	**Channel**	**Pin Numbers**	**Setting**
1	J1 and J9	Left (1A)	1 and 2	600Ω
			2 and 3	66Ω
2	J2 and J10	Right (1B)	1 and 2	600Ω
			2 and 3	66Ω
3	J3 and J11	Left (2A)	1 and 2	600Ω
			2 and 3	66Ω
4	J4 and J12	Right (2B)	1 and 2	600Ω
			2 and 3	66Ω

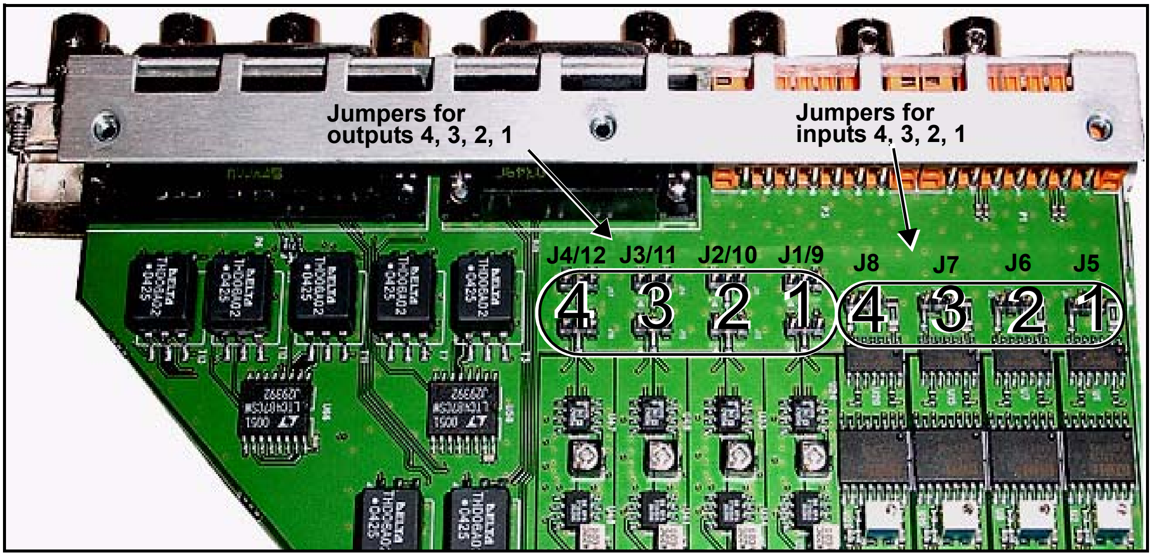


Figure 1-3. Jumper Locations for X75OPT-AS-16 and X75OPT-AS-8 Modules

Installing Audio Receptacles

To make analog audio input and output connections, you need to properly connect stripped wires for each audio channel to the provided audio receptacle. Once done, install the wired receptacle to the back panel audio input and output connectors. Follow these steps:

1. Insert a small, flathead screw driver into a rectangular hole of the audio receptacle.

   The corresponding round wire hole will open either directly above or directly below the screwdriver (see Figure 1-4).

2. Heeding the positive (+), negative (-), and ground (GND) markings on the back panel, place an appropriate stripped audio wire into the open hole.

   The top row of wire connection holes alternate between positive and ground. The bottom row of wire connection holes alternate between negative and ground. See Figure 1-4.

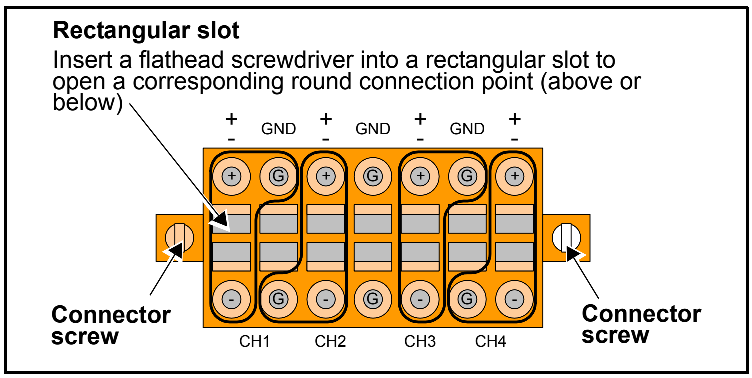


Figure 1-4. Installing Analog Audio Receptacles

3. Remove the screwdriver to lock the wire into place.
4. Repeat for other wire connections.
5. Once all wiring in completed, plug the receptacle into the analog audio input ports (each labelled **CH1 CH2 CH3 CH4**), and then secure the receptacle into place with the attached connector screws.

Special Control Considerations

For the AES input signals on DB-26 and DB-44 connectors, you can select either an **Unbalanced** or **Balanced** input (**Audio Setup** > **Input Setup** > **AES & DARS Audio** > **AES*x* Bal/UnBal Sel**). For coaxial connections, select the default setting **Unbalanced**. For XLR connections, select the **Balanced** setting.

X75OPT-AS-32, X75OPT-AS-16, or X75OPT-AS-8-L Audio Limiters

Audio limiters are available as software options on all of the X75OPT-AS audio synchronizers. The audio limiters have the following available options:

- Soft Limit Level
- Slope
- Attack Rate
- Attack Time
- Decay Rate
- Decay Time
- Noise Gate Level
- Noise Gate Time

Figure 1-5 shows the transfer function of the audio limiter. Table 1-3 on page 23 describes the various options of the audio limiter.

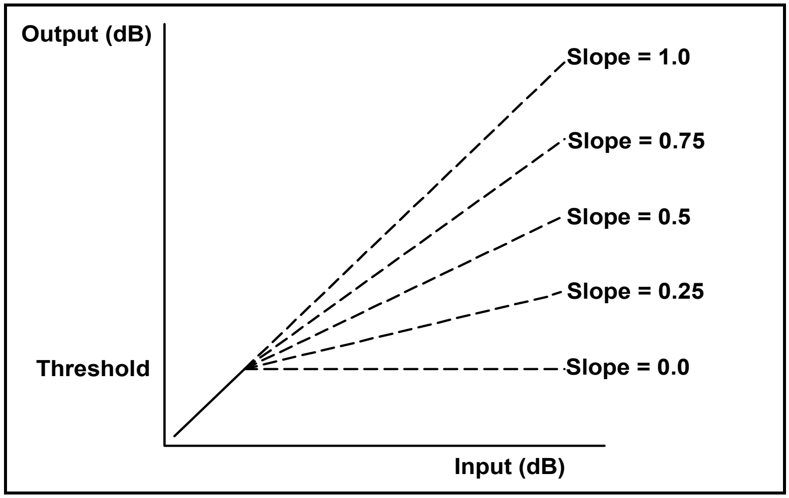


Figure 1-5. Audio Limiter Transfer Function

Table 1-3. Audio Limiter Options

Option	Description
Soft Limit Level	• Sets the threshold level for the input audio signal, measured in dB (decibels), where the audio signal limiter's attack and decaying function will be based • When a signal exceeds this level, compression will be applied
Slope	• Sets the amount a signal is reduced by the compressor • When the slope is set to 0.25, the audio input signal exceeding the soft limit threshold level will be reduced by the factor of 4 at the output.
Attack Rate	Controls the rate of attack soft limiting
Attack Time	• Activates limiter only after the input audio level remains over the Soft Limit Level for the duration specified in the Attack Time option • Audio that exceeds the specified Soft Limit Level for less than the specified Attack time will not activate the limiter • Attack Time indicates how long it takes for the compressor to act after a signal has exceeded the threshold level
Decay Rate	Controls the rate of decay soft limiting.
Decay Time	• Once the input audio signal has exceeded the Soft Limit Level and the limiter has been activated, the limiter remains active until the audio signal has returned below the Soft Limit Level for the duration specified in the Decay Time option • If the input audio signal returns below the Soft Limit Level for less than the specified Decay Time, the limiter remains active
Noise Gate Level	• Sets the noise gate threshold level, measured in dB. • When an input signal falls below this level, the noise gate will be applied.
Noise Gate Time	Indicates how long it takes for the noise gate to start or stop acting after the input signal has fallen below or risen above the threshold level.

X75OPT-A3D Analog Video Module

General Description

The optional X75OPT-A3D analog video input module and associated back panel provide selectable analog composite, component Betacam (CAV), and S-video inputs (see Figure 1-6).

The composite input is processed through a high-performance industry-leading 3D adaptive comb filter. The TBC mode is always used when the S-video input is selected. When component analog video is selected as the input, it is converted to digital and then further processed as required. Looking from the rear, this back panel is located in the top, right corner of the frame, above the dual Ethernet ports.

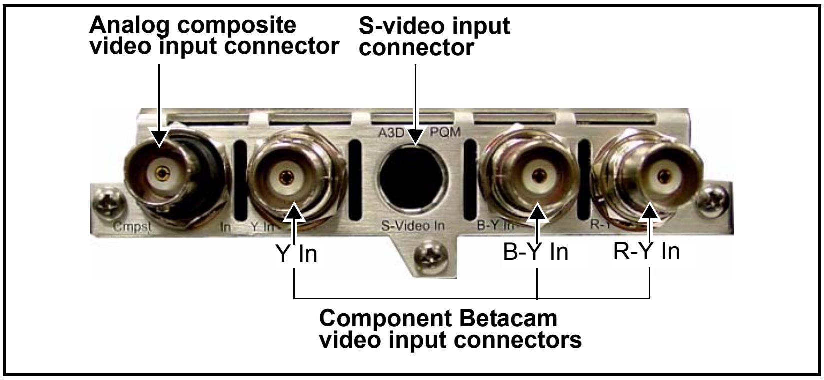


Figure 1-6. X75OPT-A3D Module Back Panel

To access, configure, and enable the analog video parameters associated with this module, enter the **Video Setup** parameter.

Special Control Considerations

Unlike SD-SDI inputs, only a single analog video source can be auto-detected. Therefore, you must pre-select the desired analog input video source (composite, S-video, or CAV) in order for the auto-detection to work across the HD-SDI/SD-SDI/analog inputs. To select a desired input, follow this path through the menu structure: **Video Setup > Analog Input (A3D) > Analog Video Source**. Additionally, set the module to **Auto Detect** (**Video Setup > Routing Setup > I/P Video Mode**).

For more information, see “Input Video Modes” on page 160.

X75OPT-PQM Video Module

General Description

The optional X75OPT-PQM module and associated back panel provide selectable analog composite, component Betacam (CAV), and S-video inputs (see Figure 1-7). This module is an economical alternative to the X75OPT-A3D option.

Composite input is processed through a 3D-adaptive comb filter. The TBC mode is always used when the S-video input is selected. When the component analog video input is selected, it is converted to digital and then further processed as required. Looking from the rear, this back panel is located in the top, right corner of the frame, above the dual Ethernet ports.

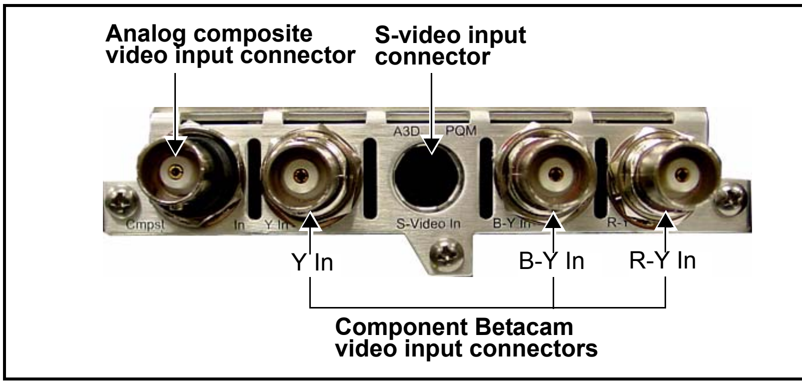


Figure 1-7. PQM-X75 Back Panel

To access, configure, and enable the analog video parameters associated with this module, enter the **Video Setup** parameter.

Special Control Considerations

Unlike SD-SDI inputs, only a single analog video source can be auto-detected. Therefore, you must pre-select the desired analog input video source (composite, S-video, or CAV) in order for the auto-detection to work across the HD-SDI/SD-SDI/analog inputs. To select a desired input, follow this path through the menu structure: **Video Setup** > **Analog Input (PQM)** > **Analog Video Source**. Additionally, set the module to **Auto Detect** (**Video Setup > Routing Setup > I/P Video Mode**).

For more information see “Input Video Modes” on page 160.

Alternate PQM Color Decoding Algorithm (NTSC Only)

The current version of the PQM decoder code provides a superior separation of luma and chroma for the digital domain (SDI output). In some cases, however, when the luma and chroma are re-combined in the encoder, the resulting image may appear “soft” (see Figure 1-8).

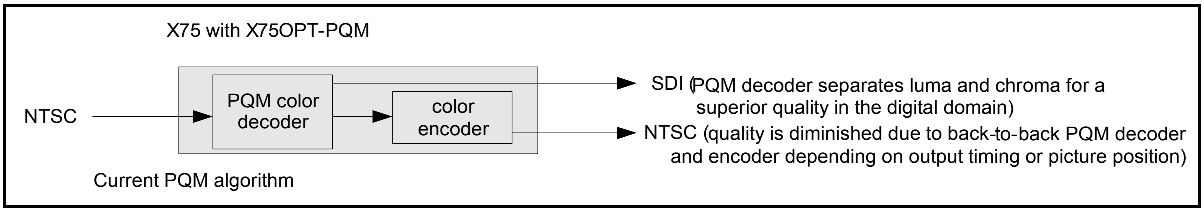


Figure 1-8. Current PQM Algorithm

When this condition occurs, the X75HD/X75SD has a useful alternate NTSC decoding algorithm that may provide better results. If an NTSC output is required (via back-to-back decoder/encoder), you can enable or disable the alternate PQM algorithm by following this path:

Video Setup > **Analog Input (PQM)** > **Proc** > **Chroma Bandpass**.

NOTE

The alternate PQM algorithm results in diminished quality in the digital domain. If the SDI output is not being used, the alternate can be selected for an improved NTSC output.

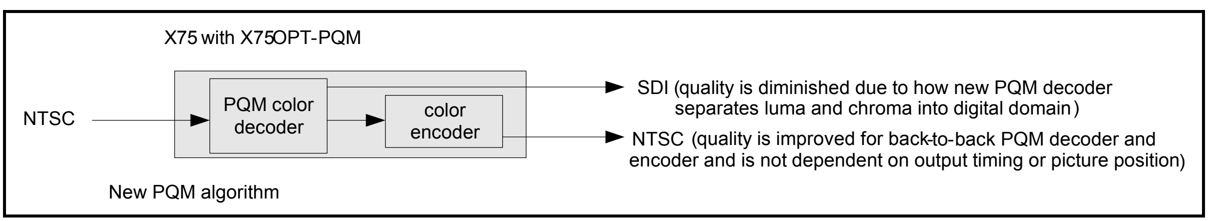


Figure 1-9. Alternate PQM Algorithm

X75OPT-HDUPG HDTV Video Module

General Description

The X75HD (or X75OPT-HDUPG) module and associated back panel provides two HDTV coaxial inputs, two HDTV coaxial outputs, one HDTV fiber input, and one HDTV fiber output. This module provides and processes on-board up/down/cross-conversions.

The back panel is located in the top, middle of the frame, above the Multi I/O and DVI-D ports. X75HD modules are factory-installed in all X75HD systems, and available as an upgrade (X75OPT-HDUPG) for all X75SD and X75-DPS frames.

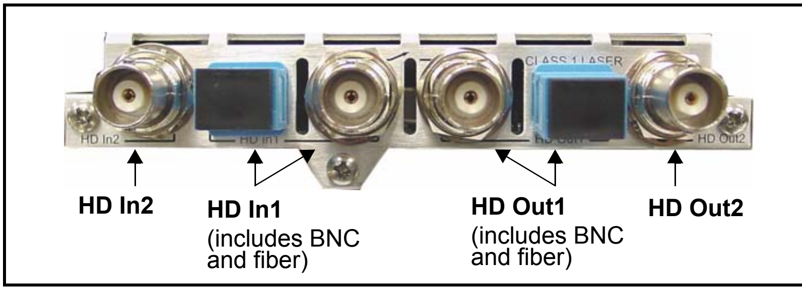


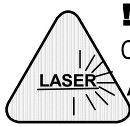
Figure 1-10. HD-X75 Back Panel

This module provides up, down, and crossconversion with both coaxial and fiber interfaces for HD. To access, configure, and enable the HDTV input and output parameters, enter the **Video Setup** parameter.

Precautions

The HD-X75 fiber optic module is a CLASS 1 laser product.

Avoid looking directly at a laser. Laser radiation is invisible and can cause serious eye damage.



!DANGER!
Class 1 Laser Product
Avoid Direct Exposure

Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

For more information on handling and connecting fiber optics, see “Handling and Connecting Fibers” on page 332.

CAUTION

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED IN THIS MANUAL MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

Special Control Considerations

The selection between HD1 and HD-Fiber is not automatic. You must pre-select the desired input video source first in order for auto-detection to work across the HD-SDI/SD-SDI/analog inputs. To select a desired input, follow this path through the menu structure: **Video Setup** > **HD Input** > **HD1/HD-Fiber Input Select**.

For more information, see “Input Video Modes” on page 162.

X85OPT-HDUPG HDTV Video Module

General Description

The X85 frame uses the X85OPT-HDUPG HDTV module. This module is capable of processing both SD-SDI and HD-SDI video.

The back panel provides two SDI coaxial inputs, two SDI coaxial outputs, two SDI fiber inputs, and two SDI fiber outputs. This module provides and processes on-board up/down/cross-conversions.

NOTE

The X85OPT-HDUPG processes both SD and HD signals. Additional SD inputs and outputs are located on the left side of the X85/X75 frame; these connections are processed by the main board of the frame, and are not controlled by the X85OPT-HDUPG module.

Unlike the X75HD module, the X85HD module processes both SD and HD signals. Because of this, X85HD parameter names often include the term **SDI** to indicate functions that operate through the X85HD module, where the X75HD parameters would include the term **HD**. Parameter names that include **SD** indicate functions that operate through the main processing module of the frame.

The back panel is located in the top, middle of the frame, above the Multi I/O and DVI-D ports. X85 HD modules are factory-installed and available as an upgrade (X85OPT-HDUPG) for all X75SD and X75-DPS frames.

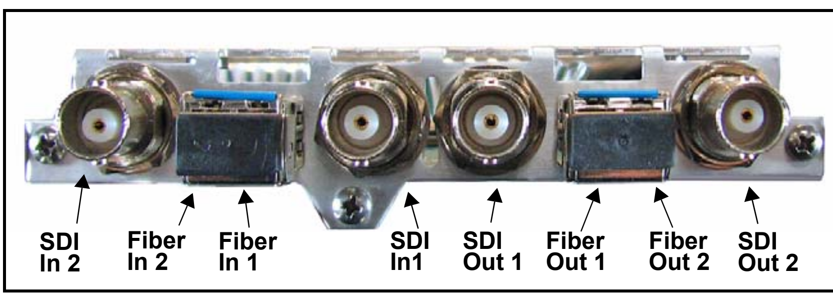


Figure 1-11. X85 Back Panel

To access, configure, and enable the HDTV input and output parameters, enter the **Video Setup** parameter.

Precautions

The X85 fiber optic module is a CLASS 1 laser product.

Avoid looking directly at a laser. Laser radiation is invisible and can cause serious eye damage.

LASER **!DANGER!** Class 1 Laser Product **Avoid Direct Exposure**	Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

For more information on handling and connecting fiber optics, see "Understanding and Working With Fiber Optics" on page 331.

CAUTION

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED IN THIS MANUAL MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

Special Control Considerations

The selection between SDI and SDI-Fiber is not automatic. You must pre-select the desired input video source first in order for auto-detection to work across the SDI inputs.

To select a desired input, follow this path through the menu structure:
Video Setup > **SDI 1 Input** > **SDI 1/Fiber1 Input Select,** or
Video Setup > **SDI 2 Input** > **SDI 2/Fiber2 Input Select**.

For more information, see "Input Video Modes" on page 160.

X75OPT-STR Streaming Video Module

General Description

X75HD/X75SD units provide the following two types of streaming:

- A small “thumbnail” 128 x 96 pixel feed, which is available from the **Ctrl/Strm** port on all X75 frames (see page 138 for details)
- An optional, higher-quality 352 x 240 pixel (525) or 352 x 288 pixel (625) feed provided at the **Streaming** Ethernet port, which is generated by the X75OPT-STR module

The optional higher-quality (1/4 VGA) streaming uses MPEG4 codec video compression. The image can be displayed at up to 30 frames per second (25 fps for PAL) with a bit rate of 200 Kbps, adjustable up to 1Mbps (the frame rate drops each time you lower the bit rate). The streaming is viewable on Quicktime™ version 7.0 or above, and requires v. 1.7 or later X75 firmware. The X75OPT-STR module provides both audio and video streaming, delayed approximately four seconds. Although the thumbnail and the higher-quality streaming feeds are provided by different modules, they both show the same output image.

The following “broadcast” standards are among those that are *not* supported as a streaming output from the X75OPT-STR module:

- AVC
- AVI
- JVT
- MPEG4 Part 10 (H.264)
- SMPTE VC-1 (WM9 or Windows Media 9)

To select the source for the X75OPT-STR module, follow these paths:

- **Video Setup > Routing Setup > Video M-Path > StrV Out Sel**
- **Audio Setup > Routing > Output > Stream OutA** (left channel) and/or **Stream OutB** (right audio channel)

NOTE

The streaming module requires its own network address. See the installation section beginning on page 363 for more information.

Minimum Requirements

The PC that monitors the X85-3G/X85HD/X75SD's streaming video using QuickTime should have the following minimum specifications when the lowest bit rate is used (200 KBps):

- Pentium 3 processor (16 MHz)
- 512 MB SD-RAM
- 300 MB free disk space
- 10 BaseT network connection
- 19-inch monitor

At the highest setting (1Mbps), the minimum requirements are the following:

- Pentium 4 processor, 3.0 GHz
- 512 MB SD-RAM
- 300 MB free disk space
- 100 BaseT network connection
- 19-inch monitor

For installation and configuration instructions, see page 363.

Typical Control Configurations

The X85-3G/X85HD/X75SD models can be configured, controlled, and monitored using the following methods:

- Local control panel on X85-3G/X85HD/X75SD models (see the *Control Panels for X75 Systems Installation and Operation Manual* for details)
- X75-RCP remote control panel (see the *Control Panels for X75 Systems Installation and Operation Manual* for details)
- Local control panel on DPS-575 frames on the same network
- RC-575 Remote control panel
- Web server control, viewable on a browser program such as Internet Explorer™ (IE) or Netscape™ (see "Configuring for HTTP Control via Web Browser" in Chapter 7, page 156 or "Operation by Web Server Software" in Chapter 6, page 129 for details)
- CCS™ (Command and Control System) applications such as Pilot or Navigator (see the CCS application online help for details)
- SNMP (Simple Network Management Protocol) and third-party control software through CCS Protocol (see "Configuring Third-Party SNMP Software Control" on page 402 for details)

All remote methods of operation involve Ethernet connections. See Figure 1-12 on page 34 for an illustration of these various control configurations.

NOTE

The maximum recommended length for a standard 10/100Base-T cable is 328 ft (100 m).

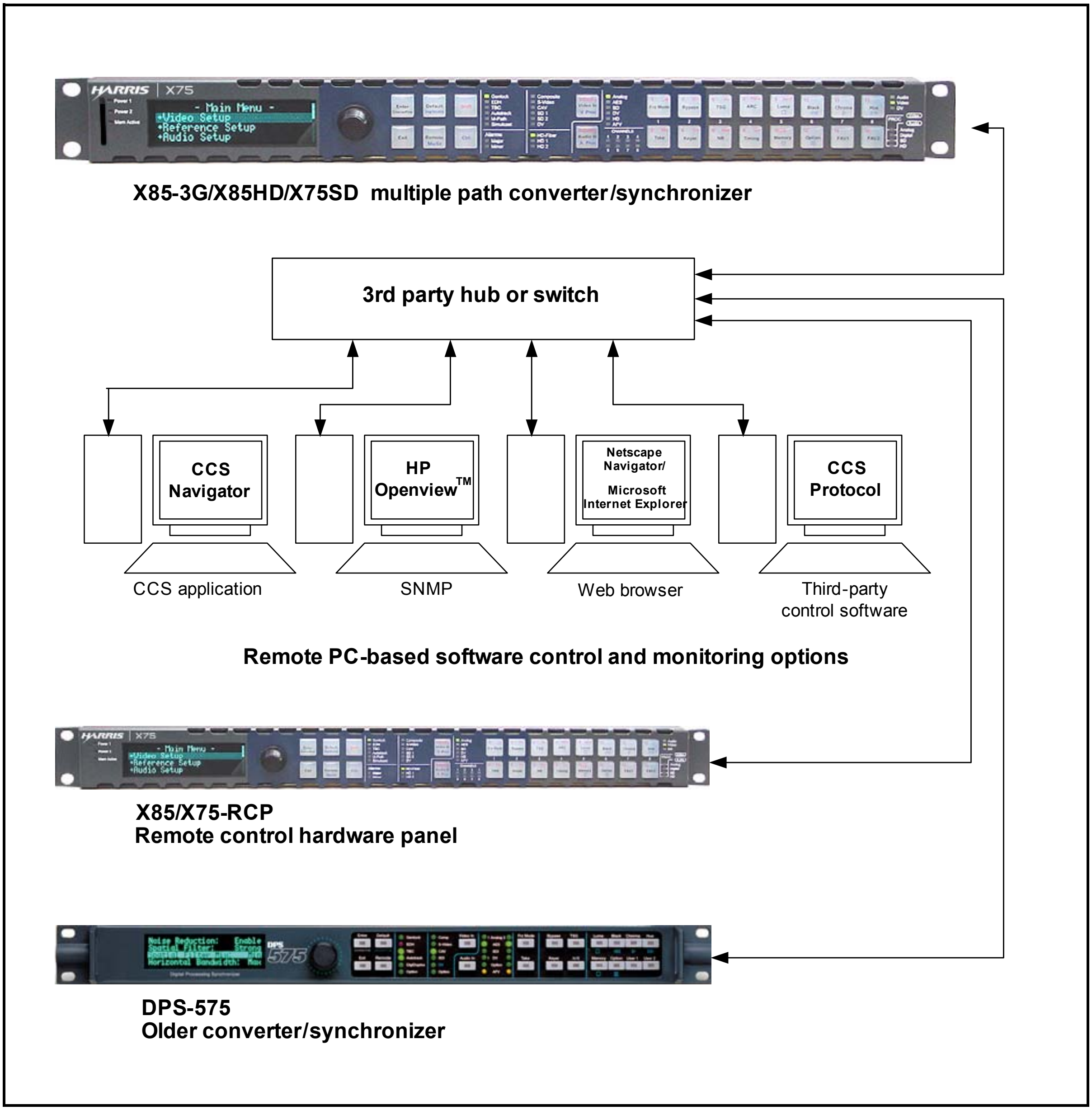


Figure 1-12. Typical Configuration, Control, and Monitoring Methods

Signal Flow

In the next pages, the following signal flow diagrams are shown:

- "X85 Signal Flow" on page 36
- "X75 Signal Flow" on page 37
- "X75 with DUOCON Option Signal Flow" on page 38
- "X75SD Signal Flow" on page 39

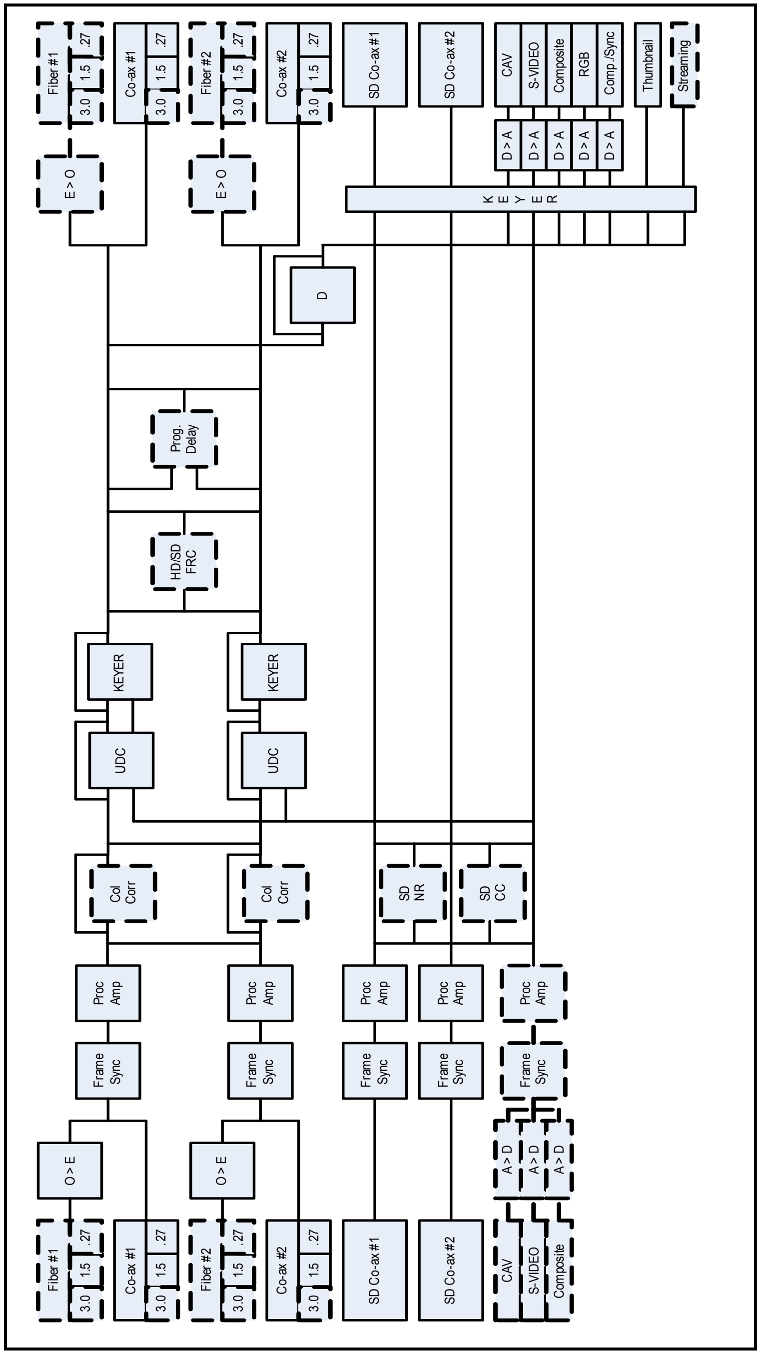


Figure 1-13. X85 Signal Flow

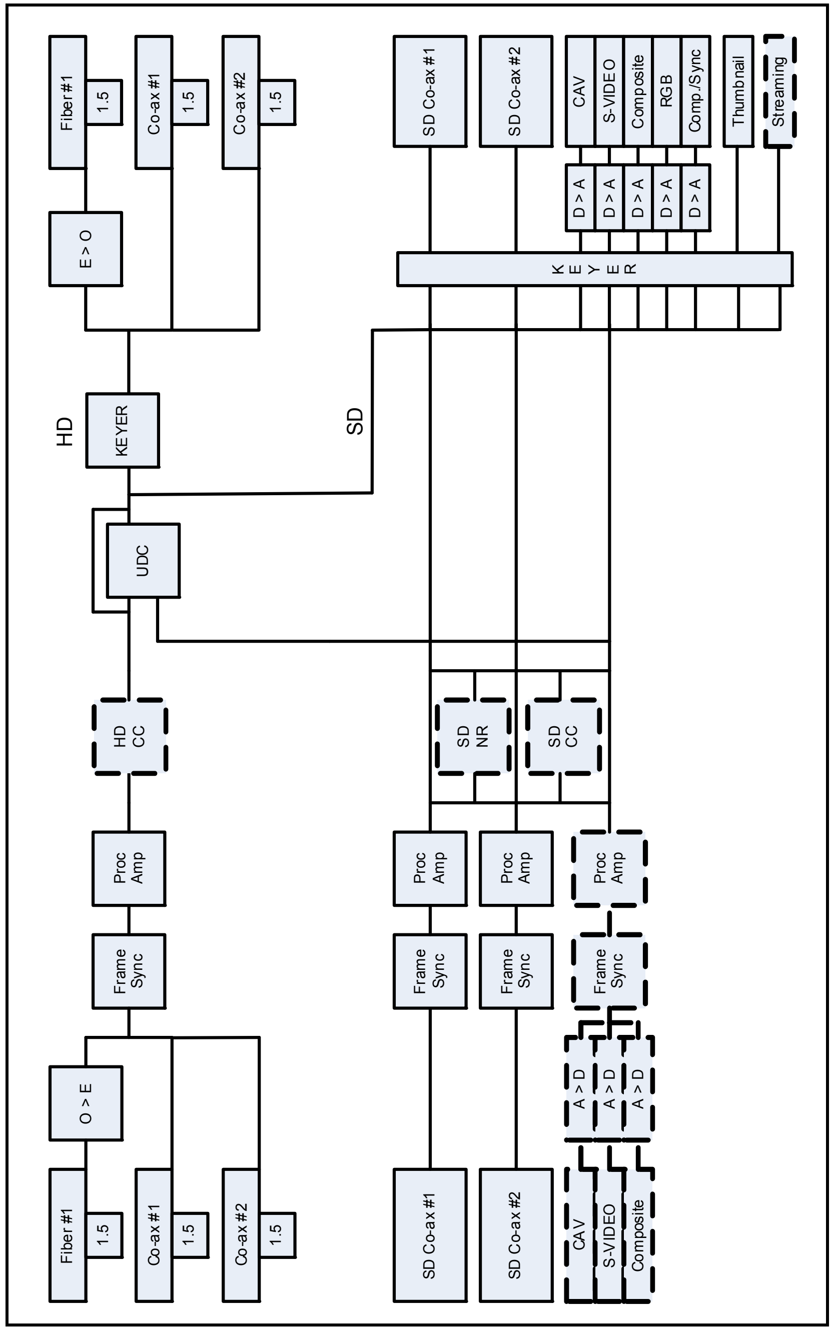


Figure 1-14. X75 Signal Flow

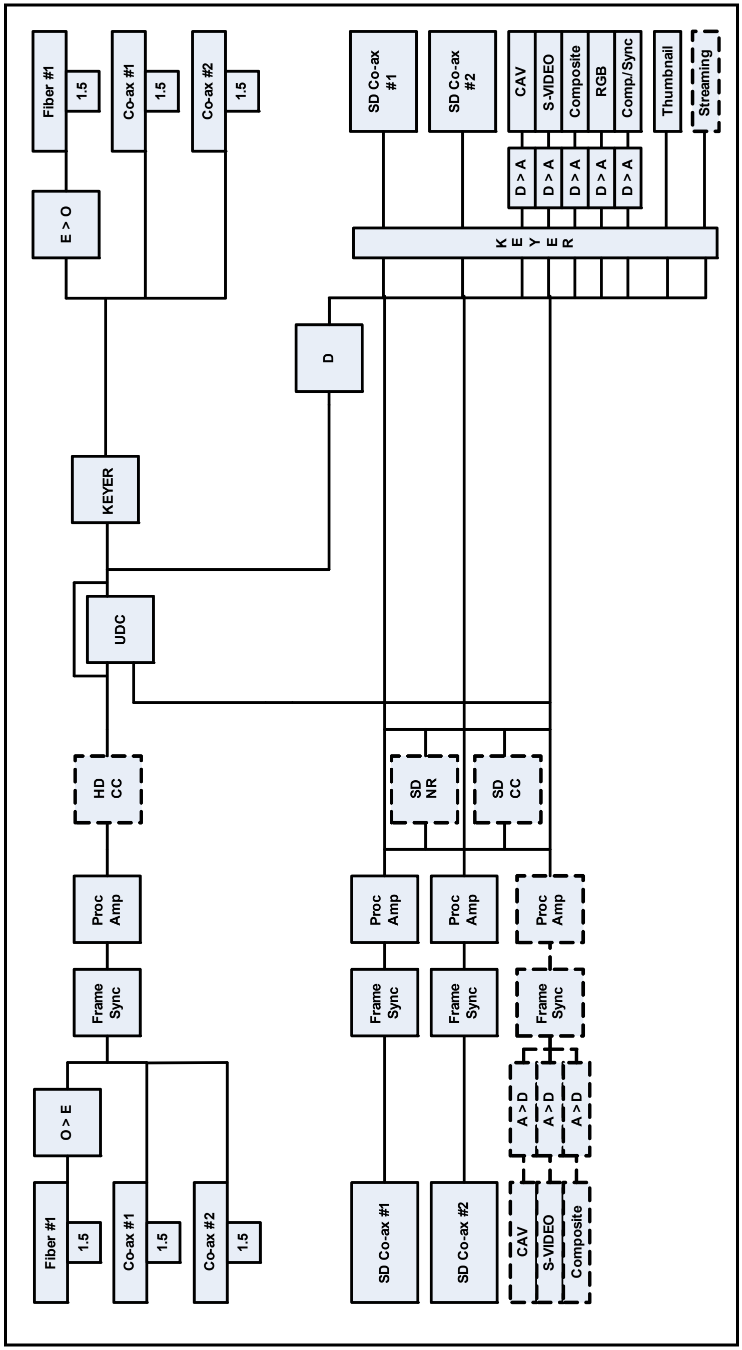


Figure 1-15. X75 with DUOCON Option Signal Flow

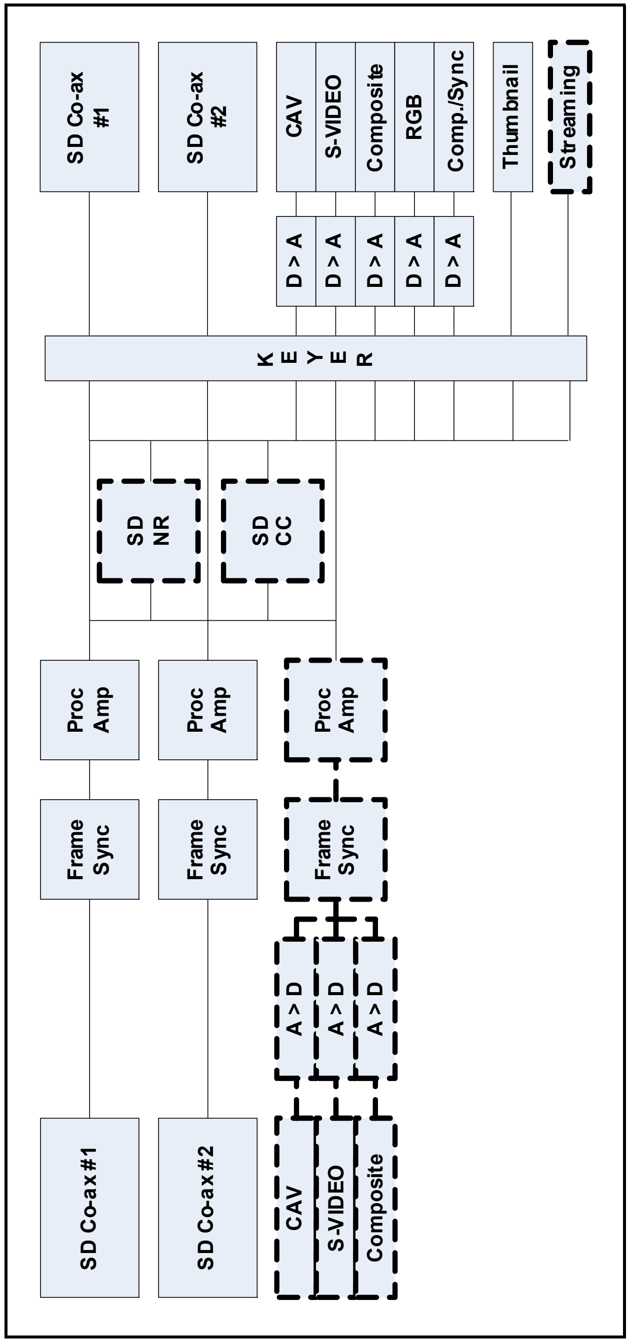


Figure 1-16. X75SD Signal Flow

Chapter 2

Operating Modes

Overview

This chapter covers the following topics:

Video Functional Block Diagram

Figure 2-1 shows a fully loaded X85/X75, with eight processing blocks. An X85/X75 frame contains five independent video frame synchronizers (each with its own video processing capabilities) and support for multiple processing functions that include the following:

- Up/cross/down conversion
- Test signal generation
- Noise reduction
- Aspect ratio conversion

With the X85 and X75, you can have single or multiple input video processing. Either one input signal can be routed to all outputs, or you can independently synchronize, phase, and process up to four video channels. The X85 adds a fifth processing channel.

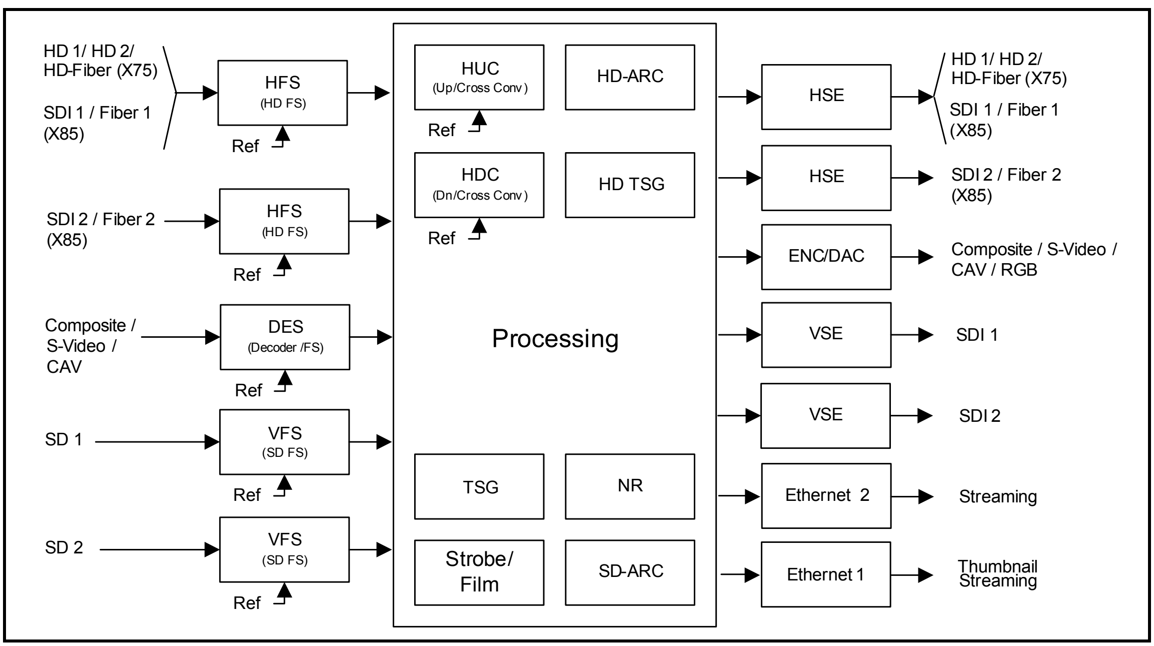


Figure 2-1. Video Functional Block Diagram

The controls for those processing blocks are located in the submenu located at **Video Setup** > **SD or SDI Processing**, and will appear automatically as the respective hardware and software options are installed.

Operating Modes

The X85/X75 has these main operational modes (**Video Setup > Routing Setup**):

- Auto Detect (default mode)
- M-Path (multiple path)
- Simulcast
- All Output Select

The X85 also includes the Program Delay feature.

Table 2-1 describes the different operating modes.

See Figure 2-3 on page 44 to Figure 2-4 on page 45 for X85 signal flow diagrams of these modes.

Table 2-1. X85-3G/X85HD/X75SD Operating Modes

Operational Mode	Description
Auto Detect (default)	The module processes video based on preset precedence levels for the input video sources.
M-Path	The user selects the outputs and the format type of the outputs.
Simulcast	The user selects any two inputs, and then switches the input by a “button push” or GPI input.
All Output Select	The user selects a video source to be fed to all outputs
Program Delay (X85 only)	Using the Program Delay option, the user can add video delay to intercept on-air profanity

X85 Signal Flow Diagrams for Operating Modes

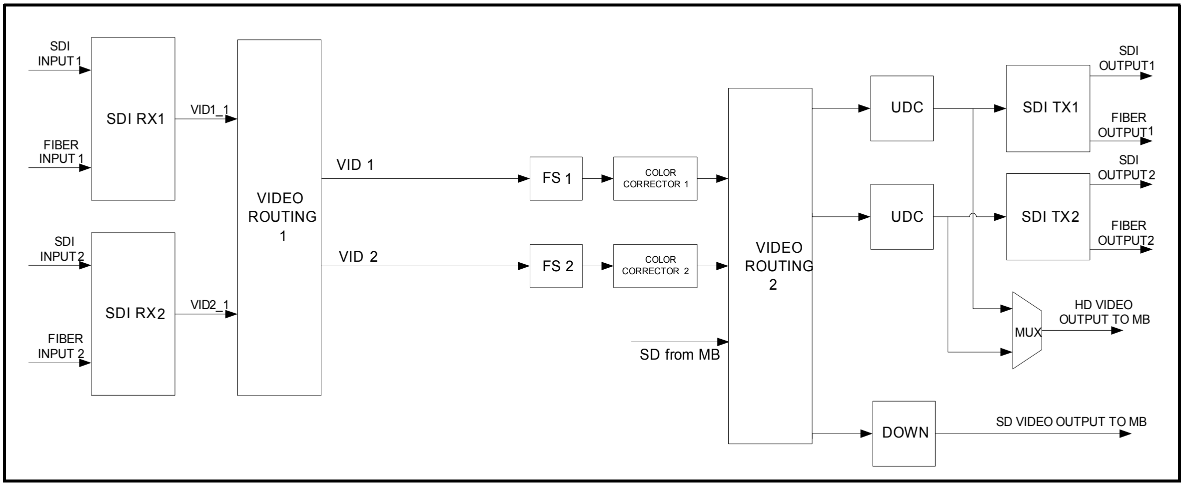


Figure 2-2. X85 M-Path Mode

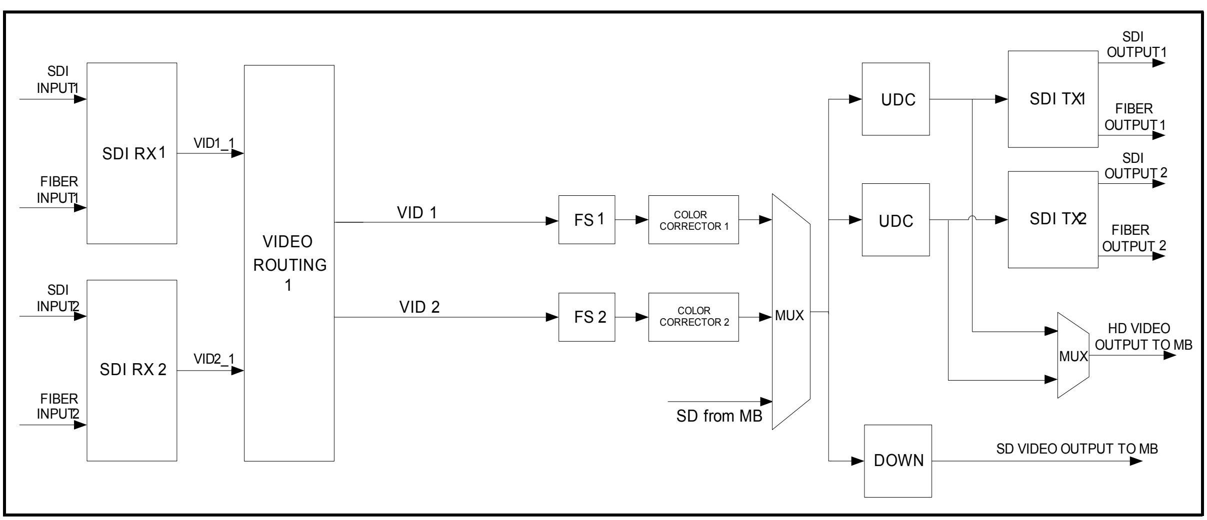


Figure 2-3. X85 Simulcast/All Output Select

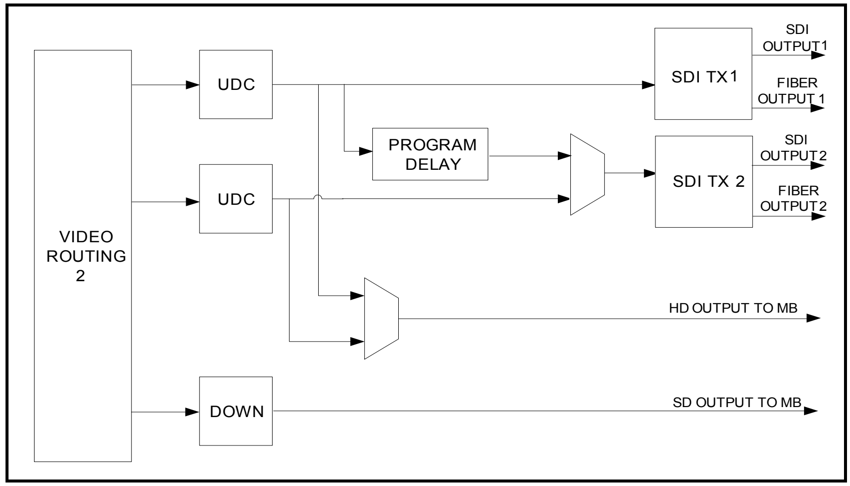


Figure 2-4. X85 Program Delay Mode

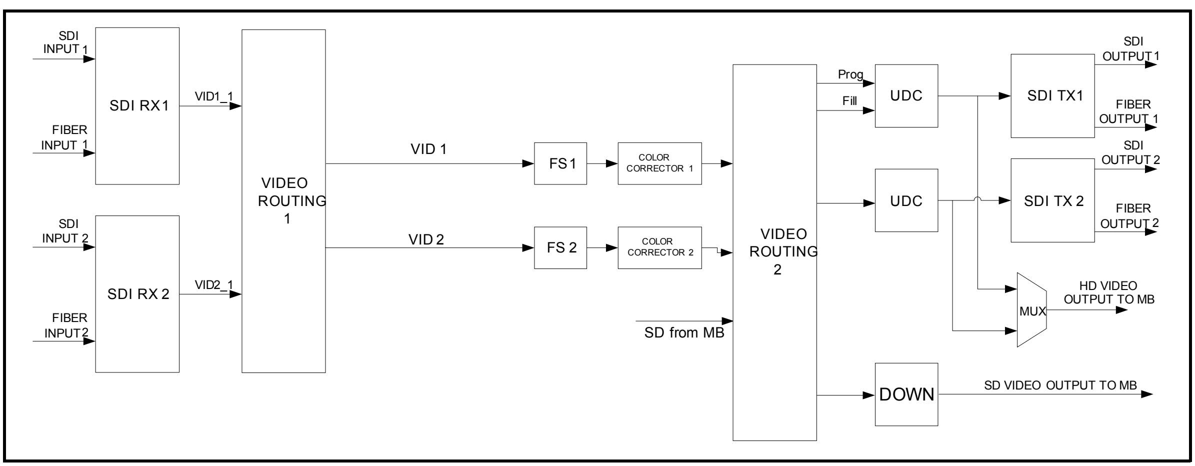


Figure 2-5. Keyer with I-Wings Side Panel Fill Mode

X75 Video Operating Modes

X75 units are shipped with **Auto Detect** video mode as the factory default setting. This mode sets the X75 to automatically detect analog, SD1, SD2, HD-F, HD1, HD2, composite, and S-video inputs. When video is connected to any of these inputs, the X75 automatically selects the applied input video and then sends the converted video to all outputs. The Video Input LEDs on the front panel show the selected video source.

In the video routing mode, first select an output, and then set the inputs to be processed to that output. Depending on the configuration, you can set up to four paths.

To operate an X75 frame in **Simulcast** mode (where any two inputs are selected to switch simultaneously between determined outputs, such as SDTV and HDTV), you will need to set up the unit to process signal information differently. To do this, see "X75 Simulcast Operation" on page 54.

For more information on the conversion capabilities and options provided by the X85, see page 430.

X75OPT-HDDUOCON Option

An X75 provides up, down, or crossconversion. With the addition of the HDDUOCON option, simultaneous up and down, or cross and down conversions are possible. The X85 provides two dual paths of up, down, and crossconversion.

Table 2-2. "DUOCON" Conversion Capability

Conversion	With X75OPT-HDDUOCON	Without X75OPT-HDDUOCON
Upconversion and downconversion	Yes	No
Upconversion and crossconversion	No	No
Downconversion and crossconversion	Yes	No

By selecting the M-Path mode, you can quickly route a particular input source to all of the X75's outputs simultaneously. Follow this path: **Video Setup > Routing Setup > All Out Sel > M-Path**.

NOTE

> If you have routed a particular input feed to an output, (or series of outputs) for up, down, or cross-converting, and then begin setting up a new conversion pattern, the existing conversion will be disrupted immediately.
>
> Analog component video inputs are only available if your X75HD/X75SD system includes an X75OPT-PQM or X75OPT-A3D module.

Several examples of M-Path video processing are illustrated in Figure 2-6 on page 48 and Figure 2-7 on page 49.

When you need a single input video source to be processed and sent to all outputs, press the **Video In** button or select the **Video Setup > Routing Setup > All Out Sel** parameter to select the desired input video source to be processed. The X75HD/X75SD automatically routes the selected input to all outputs and inserts any selected processing blocks.

When multiple and independent video channel processing is required, the **Video M-Path** parameter in **Video Setup > Routing Setup** makes it possible to assign an input source to each video output group.

Press the **Audio In** button or select the **Audio Setup > Routing > Audio In Src Select** parameter to select a single audio group type to be synchronized, processed and sent to all outputs. Depending on the selected input audio group type, the software automatically handles all internal processing, including de-multiplexing, signal routing, synchronization, and re-embedding.

The available input audio group types for selection are the following:

- Custom—When you have selected more than one type of audio input groups
- Analog—Selects all four analog audio inputs for processing
- AES—Selects all AES inputs for processing
- SD—Selects the demuxed audio from SDI input for processing
- HD—Selects the demuxed audio from HD-SDI input for processing
- Test Tones (V2A)

- Dolby Dec—Selects the internally decoded Dolby audio signals for processing

For complex audio processing applications, you can also manually route the signal by changing the parameters. Follow these two paths:

- **Audio Setup** > **Routing** > **Input**
- **Audio Setup** > **Routing** > **Output**

Each SRC can be independently configured to accept one of the available stereo audio inputs using the controls under the **Audio Setup** > **Routing** > **Input** menu.

NOTE

For quick access to the **Gain** controls for each **SRC**, press the **Ctrl** and **A Proc** buttons.

The controls under the **Audio Setup** > **Routing** > **Output** menu allow each mono audio output to be independently derived from any of the SRCs, audio mute, or test tones.

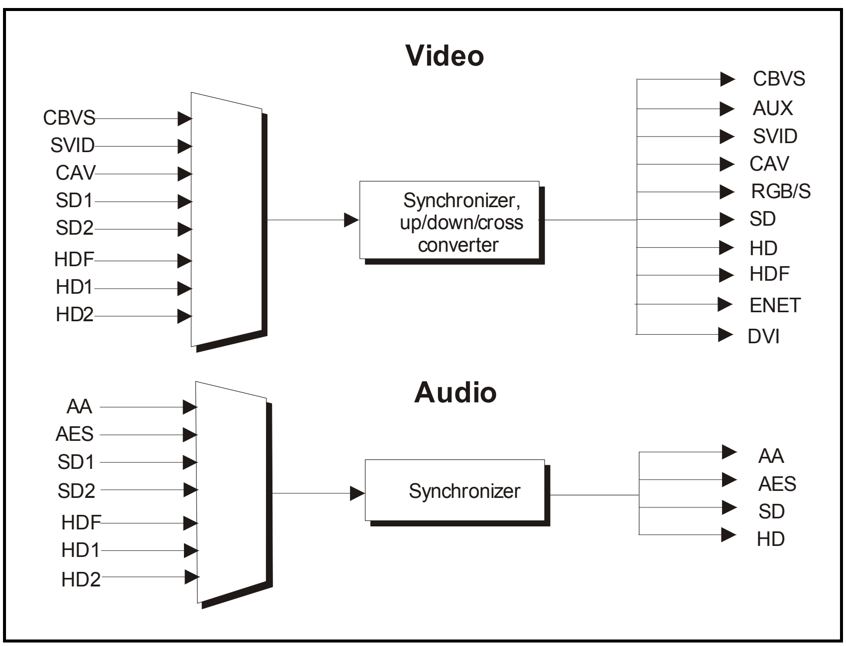


Figure 2-6. X75 M-Path Single-Source Video and Audio Processing

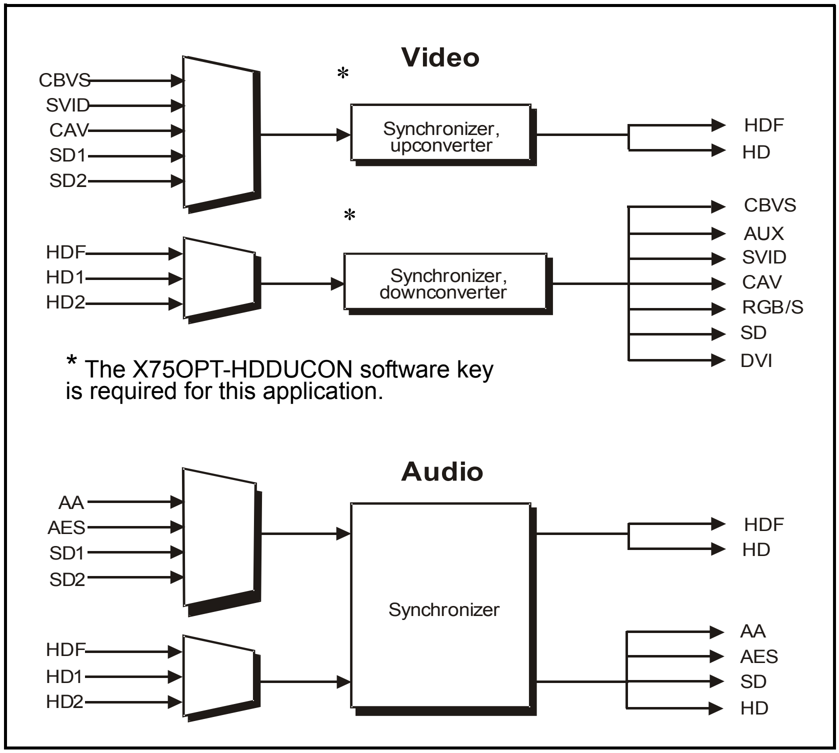


Figure 2-7. X75 M-Path (Dual Source Video and Audio) Processing

Audio Processing

Depending upon your unit's options, the X75HD/X75SD can process up to 32, 16, or 8 channels of audio simultaneously with video. Any combination of audio is assigned from the inputs (4-channel analog audio, 8/5/2 AES balanced or unbalanced, up to 4 groups demuxed from the SD-SDI and HD-SDI input) into the 16-channel processor.

Processed audio signals can be mapped to all outputs. When you select one audio input set, mono channels are mapped intelligently to provide outputs to all available channels. Audio outputs include the following: 4-channel analog audio, 8/5/2 AES balanced and unbalanced, up to 4 groups muxed into the SD-SDI and HD-SDI outputs.

Figures 2-8, 2-9, and 2-10 show the audio processing flow in 8-, 16-, and 32-channel applications, respectively.

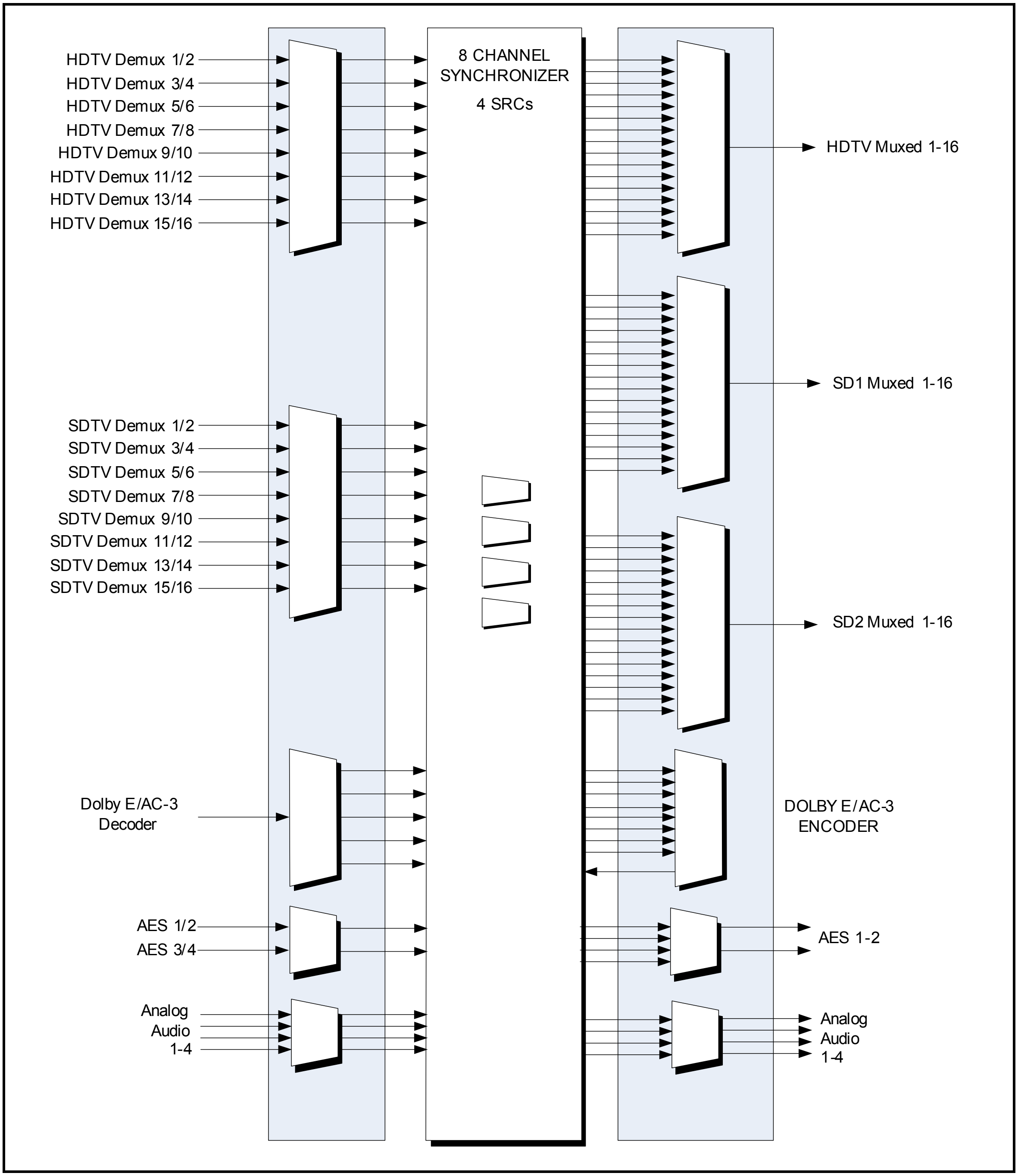


Figure 2-8. Eight-Channel Audio Functional Block Diagram

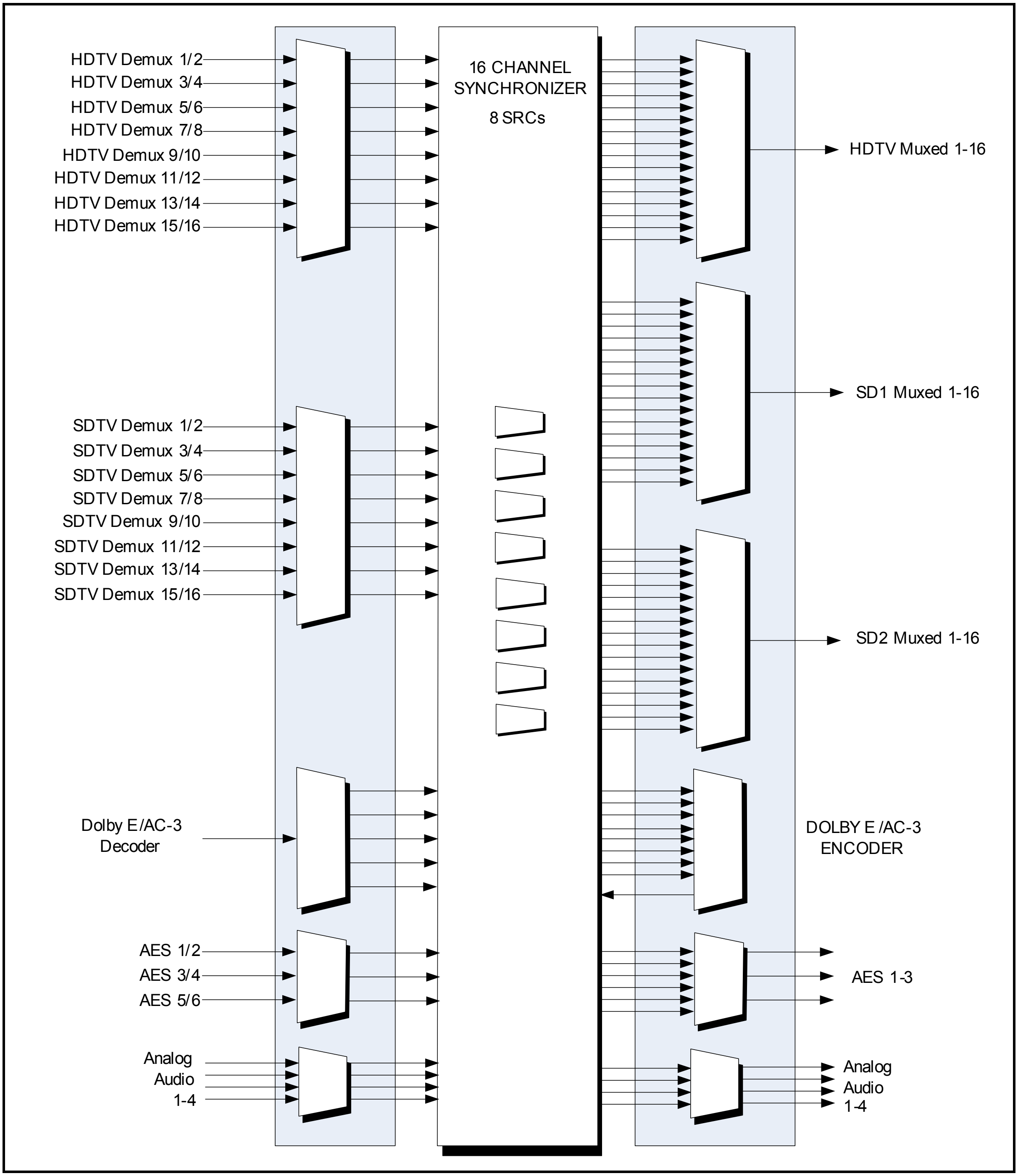


Figure 2-9. 16-Channel Audio Functional Block Diagram

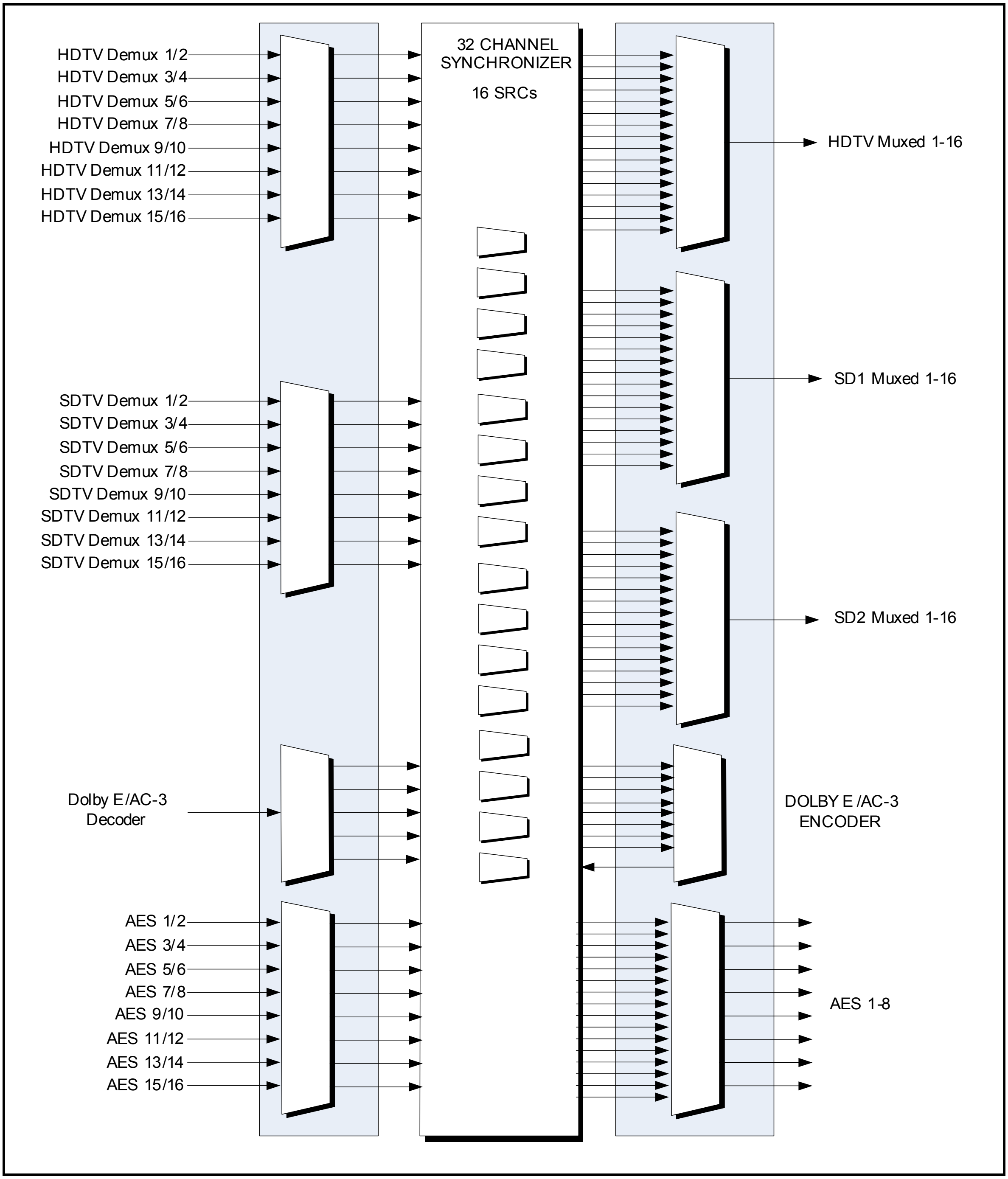


Figure 2-10. 32-Channel Audio Functional Block Diagram

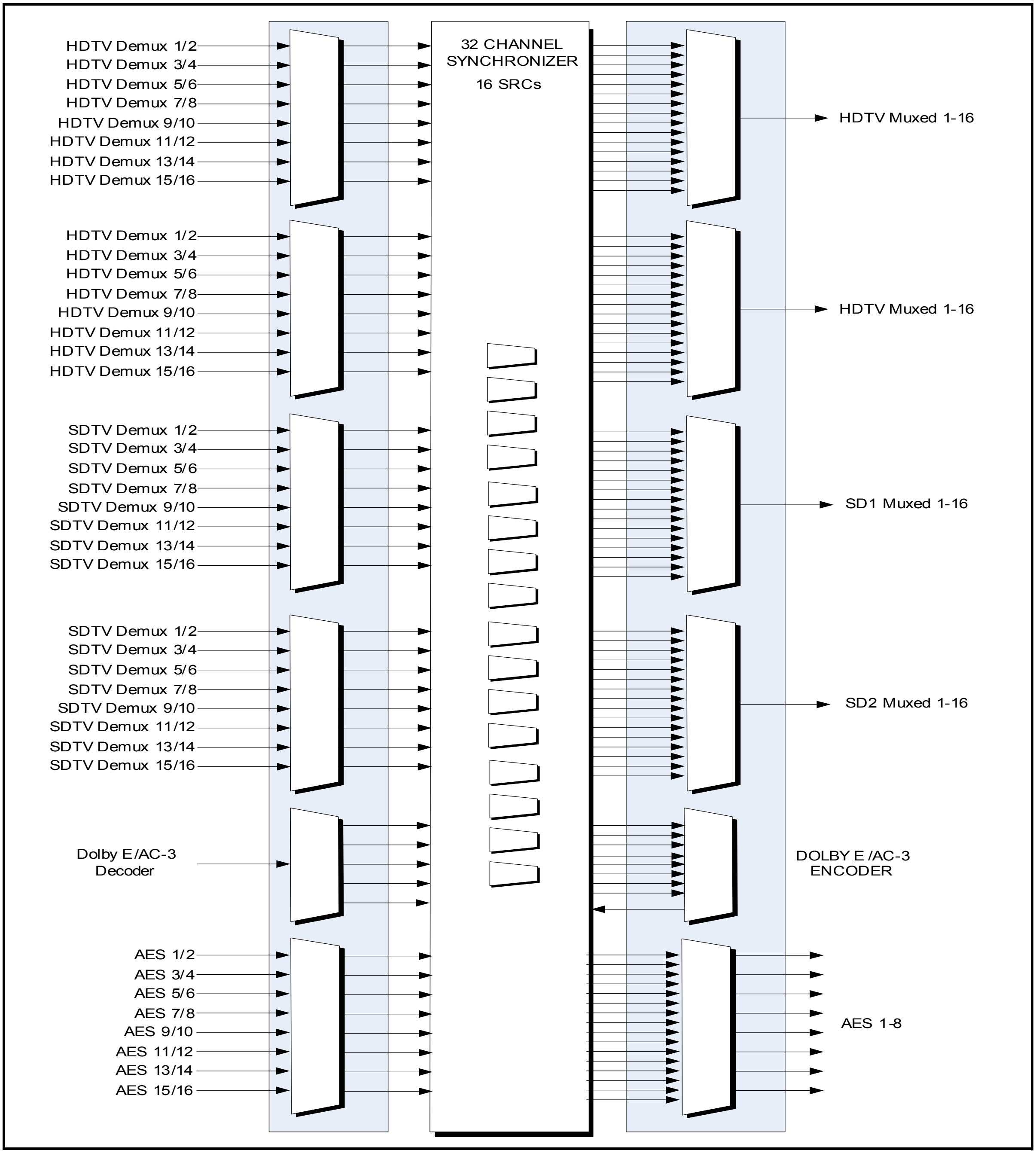


Figure 2-11. 32-Channel 3 Gb/s Audio Functional Block Diagram

X75 Simulcast Operation

Using the Simulcast mode, you can quickly switch between the two input sources (Input A, and Input B) out of the many possible inputs. Select the video sources to both Input A and Input B via the following path: **Video Setup** > **Routing Setup** > **Simulcast**.

The **Simulcast Sel** parameter switches between the two inputs. This switching can also be activated from the GPI input. To operate the unit in **Simulcast** mode, use the **I/P Video Mode** parameter (**Video Setup** > **Routing Setup**).

When you enable the Simulcast mode, the X75HD/X75SD can switch SDTV and HDTV inputs to simultaneous, deterministic SDTV and HDTV outputs. Use this mode when you need to alternate between both HDTV and SDTV signals and broadcast them together (for example, if you have an HDTV satellite feed carrying the programming and an SDTV local feed carrying the advertisements). Figure 2-12 shows a simplified illustration. For more information on selecting inputs for Simulcast processing, see "Processing Modes" on page 159.

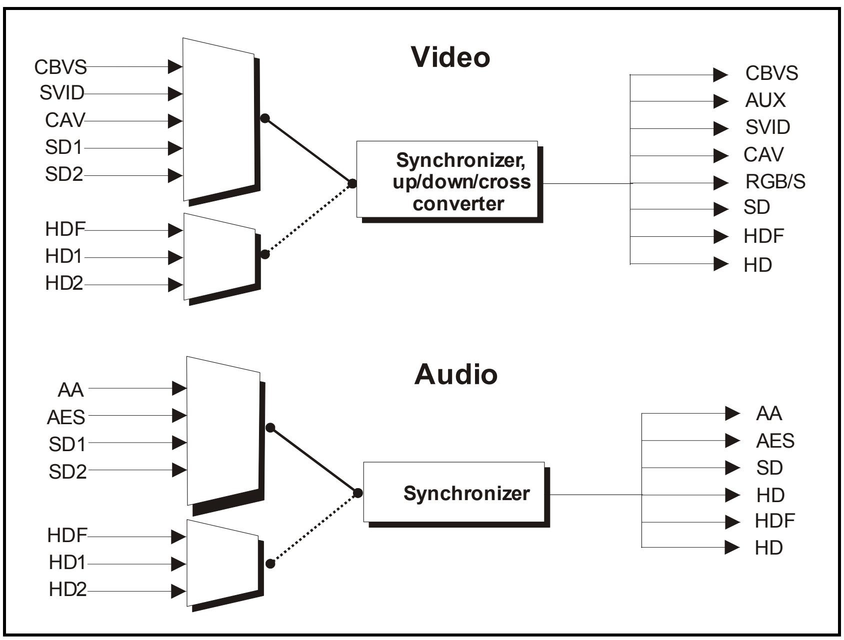


Figure 2-12. X75 Simulcast Processing

As a switcher, the X75HD switches between two SDTV inputs with clean outputs and voice-over (see Figure 2-13).

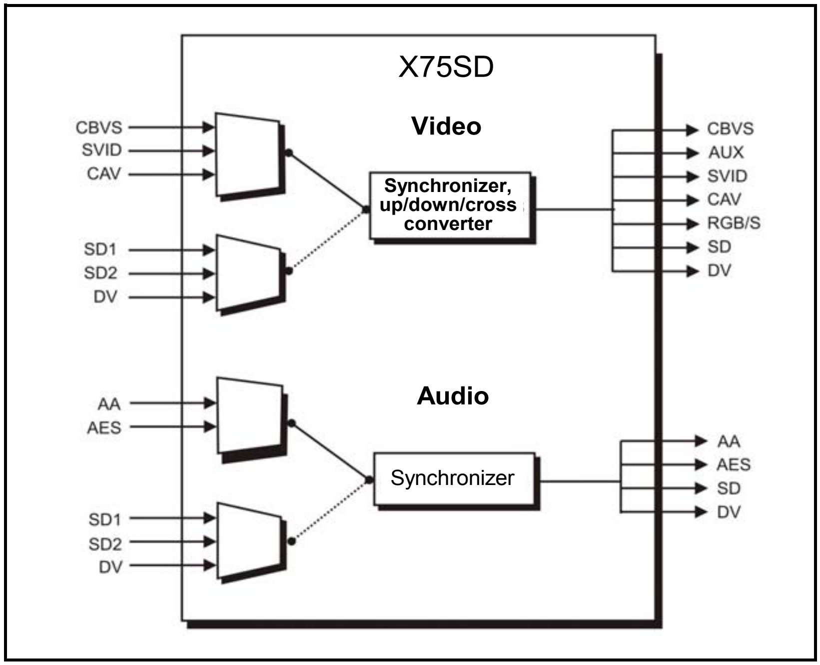


Figure 2-13. X75 Simulcast Switcher Application

Program Delay

This feature makes it possible to create an adjustable delay in the program signal, providing a profanity delay. The feature provides the following ranges:

- 0.00 s to 10.14 s (1080i/59.94)
- 0.00 s to 10.11 s (720p/59.94)
- 0.00 s to 10.13 s (1080p/23.98)
- 0.00 s to 10.12 s (1080i/50, 720p/50, 1080p/25)
- 0.00 s to 27.68 s (SD-525 Out)
- 0.00 s to 27.88 s (SD-625 Out)
- 0.00 s to 5.07 s (1080p/59.94 Out)
- 0.00 s to 5.06 s (1080p/50 Out)

The controls for this feature are found at **Video Setup > SDI Processing > Program Delay.**

Chapter 3

Applications

Overview

X85 and X75 units function in many different ways, taking on a wide variety of roles. This chapter includes some common applications using the X85 that may apply in your facility:

- "X85 Input Video Processing" on page 58
- "X85 Video and Audio Converting" on page 63
- "X85 Bridging Router Switchers" on page 65
- "X85 Simulcast Switching" on page 66

The following applications are similar, except that they use older X75HD products:

- "X75 Input Video Processing" on page 67
- "X75 Video and Audio Converting" on page 72
- "X75 Bridging Router Switchers" on page 74
- "X75 Simulcast Switching" on page 75

In the following pages, a variety of typical applications are described, along with the settings required for quick setup.

For applications involving Dolby products, see the *X85-3G/X85HD/X75SD Dolby and Audio Metadata Applications User Manual*.

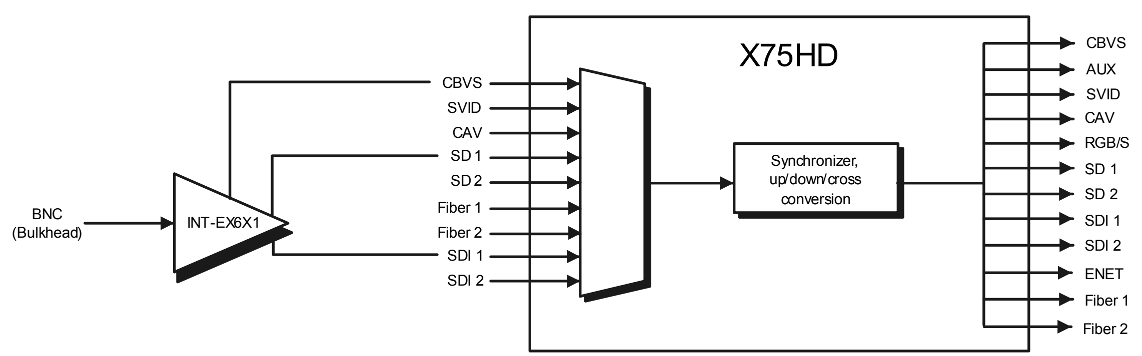
X85 Input Video Processing

This section includes the following common input video processing applications:

- Table 3-1: "Input Video Processing for Mobile or Outside Broadcast Vehicles" on page 59
- Table 3-2: "Critical Input Video Processing for Satellite/Microwave Reception" on page 60
- Table 3-3: "Input Video Processing for News Production" on page 62

Table 3-1. Input Video Processing for Mobile or Outside Broadcast Vehicles

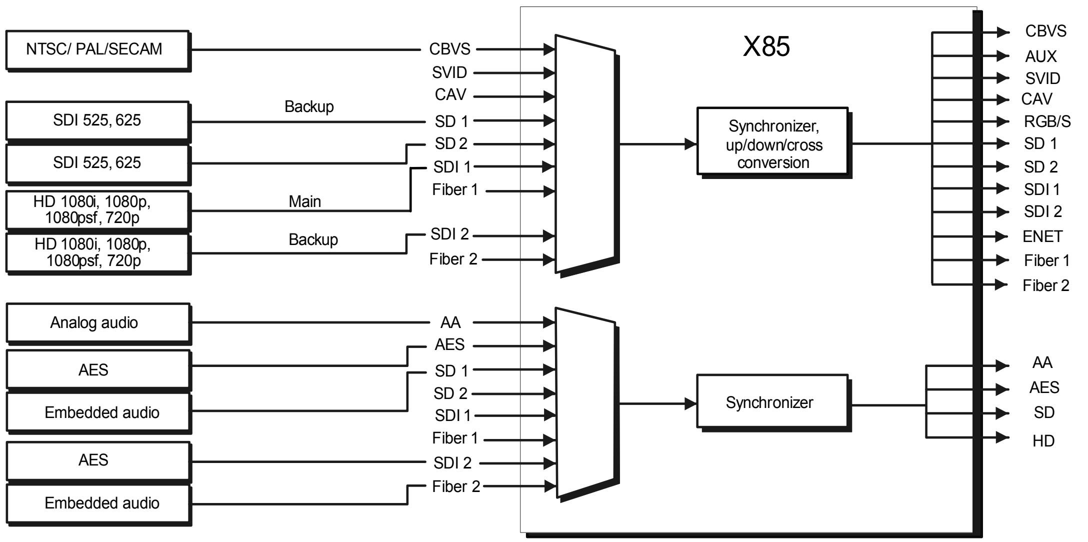
Description	Products
The X85 auto-detects a composite, SD-SDI or HD-SDI input and then sends it through the video processing engine to provide multiple types of outputs. The X85 automatically converts any composite, SD-SDI or HD-SDI signal to the required output format. A single BNC connector on the bulkhead of a mobile or outside broadcast vehicle feeds a wideband distribution amplifier. The wideband distribution amplifier feeds into the composite, SDI and fiber inputs of the X85. The X85 is set up to auto-detect any of these types of inputs and provide processed video to all of the outputs. You can preset the HDTV output to provide the required format (for example, 1080i or 720p) for production. If the precedence of all the inputs is set the same (for example, if all of the Auto Detect Setup options are set to Normal as shown below), the the priority of switching is defined by the menu list order.	X85 with these options: • X75OPT-A3D analog video input option • INT-EX6X1 (16 channel video wideband distribution amplifier)



Parameter Paths
Video Setup > Routing Setup > I/P Video Mode > Auto Detect
Video Setup > Routing Setup > Auto Detect Setup > Analog In > Normal
Video Setup > Routing Setup > Auto Detect Setup > SD1 In > Normal
Video Setup > Routing Setup > Auto Detect Setup > SDI 1/Fiber 1 In > Normal

Table 3-2. Critical Input Video Processing for Satellite/Microwave Reception

Description	Products
The X85 auto-detects and then switches HD-SDI main and backup receivers (with an SDTV backup receiver) through the video processing engine to provide multiple types of outputs. Main (primary) and backup (secondary) HDTV receivers provide inputs which are automatically switched and processed to the required output format. A tertiary SDTV receiver provides a backup if both HDTV receivers do not have outputs.	X85HD-AV with X75OPT-A3D analog video input option



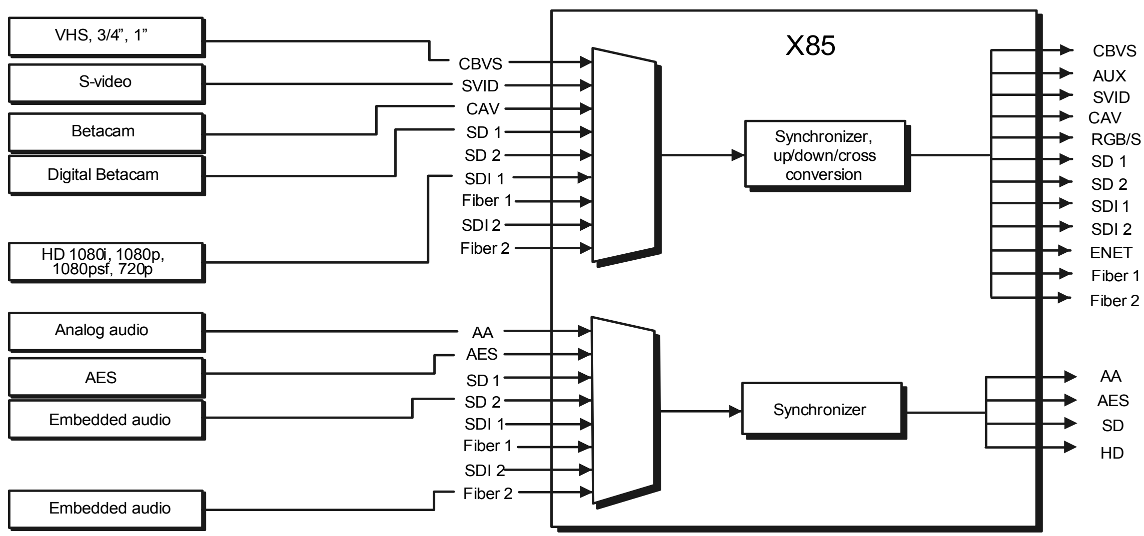
Parameter Paths
Video Setup > Routing Setup > I/P Video Mode > Auto Detect
Video Setup > Routing Setup > Auto Detect Setup > SDI 1/Fiber 1 In > Highest
Video Setup > Routing Setup > Auto Detect Setup > SDI 2/Fiber 2 In > High
Video Setup > Routing Setup > Auto Detect Setup > SD1 In > Normal
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-Aud Follows Vid > On
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD1 > AES1a/1b
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD2 > SDI X1/2
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-SD 1 > SD X1/2

Table 3-2. Critical Input Video Processing for Satellite/Microwave Reception

Additional Factory Default Settings
Audio Setup > Routing > Output > AA Out1 > SRC1a
Audio Setup > Routing > Output > AA Out2 > SRC1b
Audio Setup > Routing > Output > AES1 OutA > SRC1a
Audio Setup > Routing > Output > AES1 OutB > SRC1b
Audio Setup > Routing > Output > SMX/HMX 1 > SRC1a
Audio Setup > Routing > Output > SMX/HMX 2 > SRC1b

Table 3-3. Input Video Processing for News Production

Description	Products
The X85 selects and accepts inputs from various composite, SD-SDI or HD-SDI tape machines, and then sends the signal through the video processing engine to provide multiple types of outputs. Select and convert any tape format to the required output format.	X85HD-AV with X75OPT-A3D analog video input option



Parameter Paths
Button Shortcut: Video In (select an option) or Video Setup > Routing Setup > All Out Sel > (select one of:) M-Path/Composite/S-Video/CAV/SD 1/SD 2/ Fiber 1/Fiber 2/SDI 1/SDI 2
Button Shortcut: Audio In (select an option) or Audio Setup > Routing > Audio In Src Select > Custom, Analog, AES, SD, HD (Select one)

X85 Video and Audio Converting

Table 3-4 describes a common video and audio converting application, using a wrap-around for tape transports.

NOTE

Many input and output choices are possible. This example is based on SD 1+ AES1 inputs for up-conversion and CVBS+ AA (analog audio) outputs for down-conversion.

Table 3-4. Wrap-Around for Tape Transports

Description	Products
The X85 provides conversion and processing for video and audio for HDTV and all SDTV formats. Video and audio connections through the X85 provide conversion and synchronization (along with time base correction, if required) for standard definition and high definition tape transports. This example uses SD 1-to- SDI 1output and SDI 1-to-SD 1 output with embedded audio.	X85HD-AV

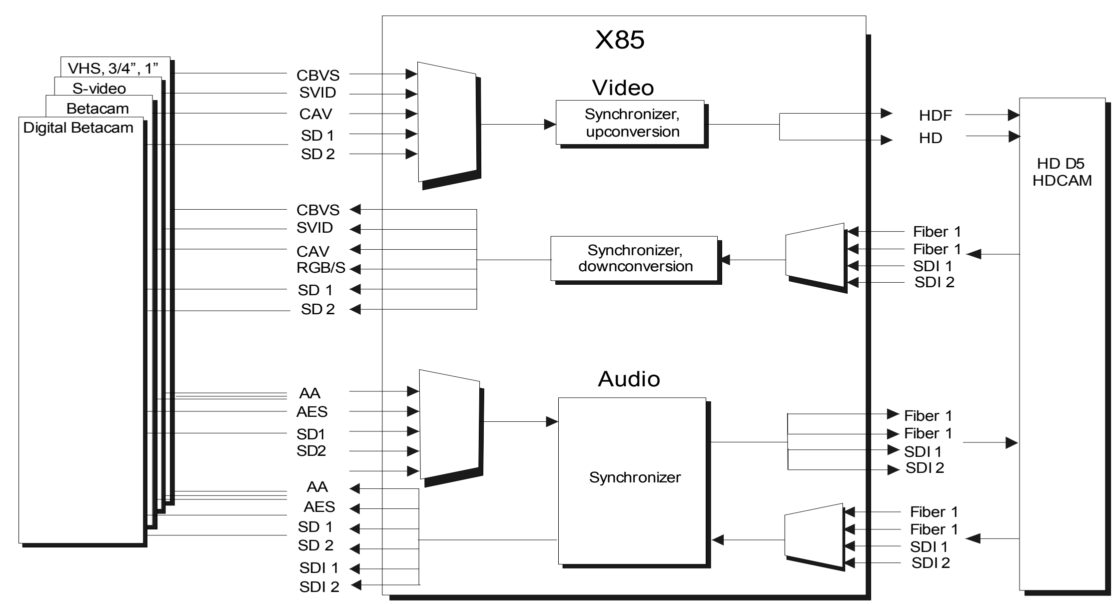


Table 3-4. Wrap-Around for Tape Transports

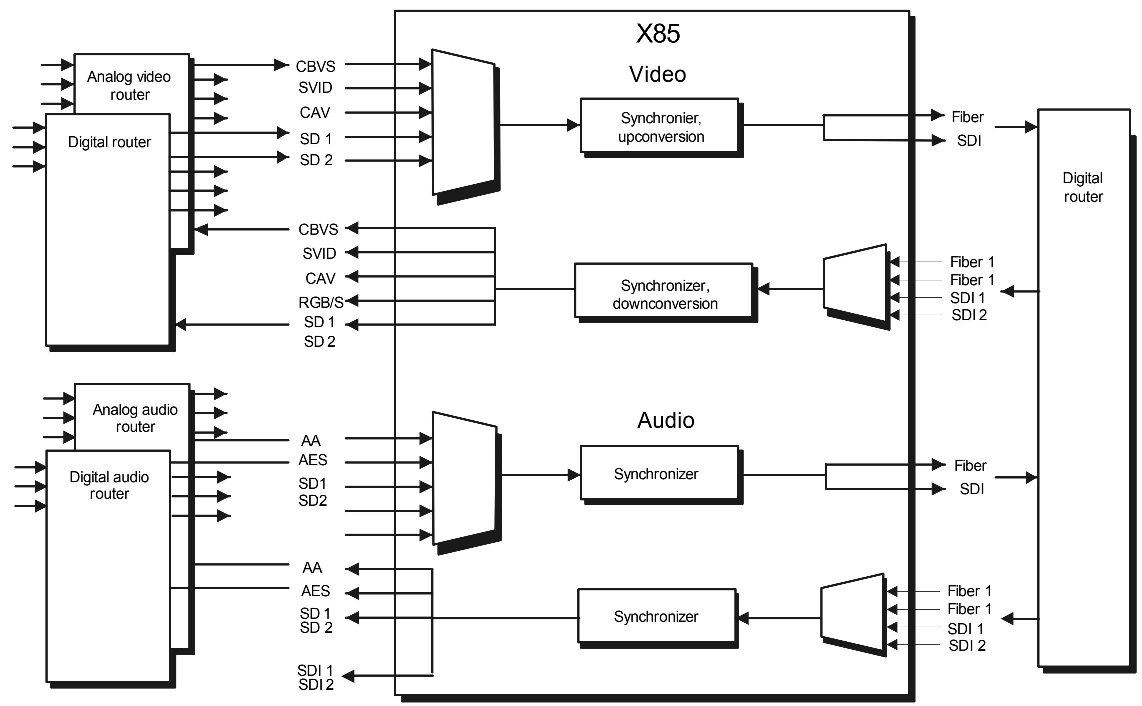
Parameter Paths
Video Setup > Routing Setup > Video M-Path > SDI 1 Out Sel > SD 1
Video Setup > Routing Setup > Video M-Path >SD 1 Out Sel > SDI 1
Audio Setup > Routing > Input > SRC1 Input Select > SDIX 1/2
Audio Setup > Routing > Input > SRC2 Input Select > SDIX 3/4
Audio Setup > Routing > Input > SRC3 Input Select > SDX 1/2
Audio Setup > Routing > Input > SRC4 Input Select > SDX 3/4
Audio Setup > Routing > Output > SMX/HMX1 > SRC1a
Audio Setup > Routing > Output > SMX/HMX2 > SRC1b
Audio Setup > Routing > Output > SMX/HMX3 > SRC2a
Audio Setup > Routing > Output > SMX/HMX4 > SRC2b
Audio Setup > Routing > Output > SD1 Embedded Audio > SMX1 Input 1
Audio Setup > Routing > Output > SD1 Embedded Audio > SMX1 Input 2
Audio Setup > Routing > Output > SD1 Embedded Audio > SMX1 Input 3
Audio Setup > Routing > Output > SD1 Embedded Audio > SMX1 Input 4 >
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > SDI 1 Out
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > SDI 2 Out
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC3 > SD Out 1
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC4 > SD Out 2

X85 Bridging Router Switchers

Table 3-5 describes a common application for bridging router switchers. To configure the X85 for this application, use the parameter settings shown for "Wrap-Around for Tape Transports" on page 63.

Table 3-5. Bridging Between Routing Switchers with Different Formats

Description	Products
The X85 provides conversion and processing for video and audio for HDTV and all SDTV formats. Video and audio can be converted through the X85 providing bridges between sources and destinations in hybrid facilities.	X85HD, Panacea and Integrator Routing Systems

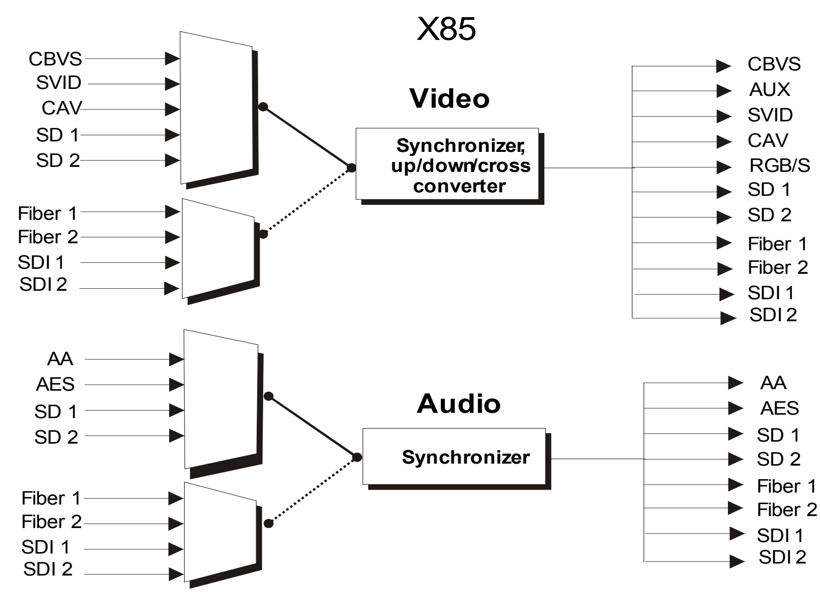


X85 Simulcast Switching

Table 3-6 describes a common application for simulcast switching of SDTV and HDTV signals.

Table 3-6. Simulcast Switching of Standard and High Definition Signals

Description	Products
You can configure the X85 to do an A/B switch using any two inputs; all inputs are provided simultaneously. In this example, A=HD, and B=SD. Simultaneous HD and SD outputs are available. You can perform the A/B switch manually or by GPI.	X85HD-AV



Parameter Paths
Video Setup > Routing Setup > I/P Video Mode > Simulcast
Video Setup > Routing Setup > Simulcast > Input A > SD I 1
Video Setup > Routing Setup > Simulcast > Input B > SD 1
Video Setup > Routing Setup > Simulcast > Simulcast Sel > Input A or System Config > Setup > GP-1 Function > Simulcast A/B
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-Aud Follows Vid > On
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD1 > SDIX 1/2
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-SD1 > AES1a/1b or SDX 1/2

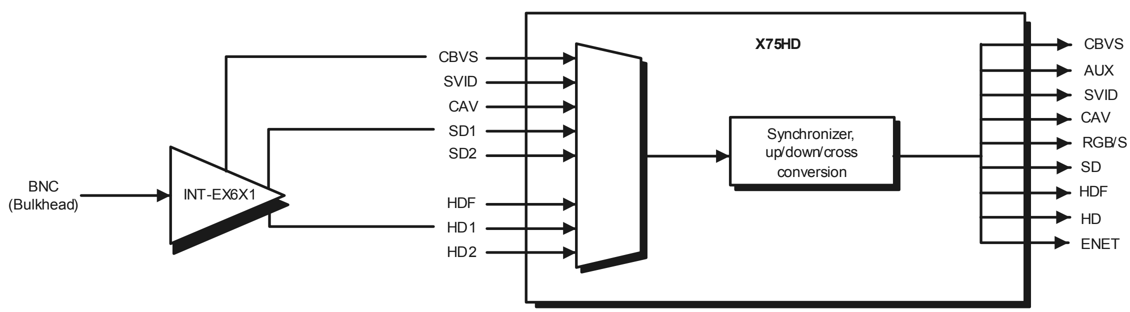
X75 Input Video Processing

This section includes the following common input video processing applications:

- Table 3-7: "Input Video Processing for Mobile or Outside Broadcast Vehicles" on page 68
- Table 3-8: "Critical Input Video Processing for Satellite/Microwave Reception" on page 69
- Table 3-9: "Input Video Processing for News Production" on page 71
- Table 3-10: "Wrap-Around for Tape Transports" on page 72
- Table 3-11: "Bridging Between Routing Switchers with Different Formats" on page 74
- Table 3-12: "Simulcast Switching of Standard and High Definition Signals" on page 75

Table 3-7. Input Video Processing for Mobile or Outside Broadcast Vehicles

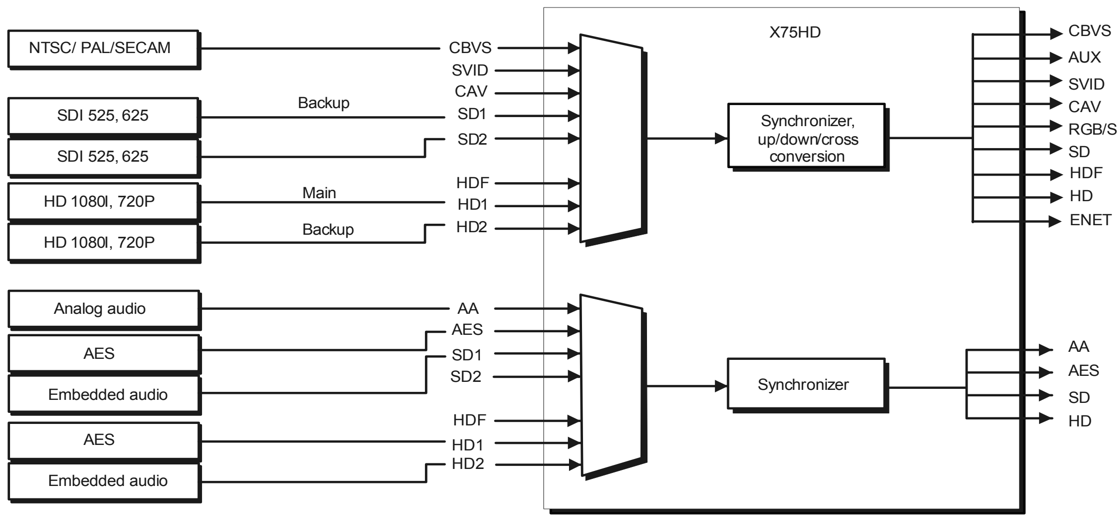
Description	Products
The X75HD auto-detects a composite, SD-SDI or HD-SDI input and then sends it through the video processing engine to provide multiple types of outputs. The X75HD automatically converts any composite, SD-SDI or HD-SDI signal to the required output format. A single BNC connector on the bulkhead of a mobile or outside broadcast vehicle feeds a wideband distribution amplifier. The wideband distribution amplifier feeds into the composite, SD-SDI and HD-SDI inputs of the X75HD. The X75HD is set up to auto-detect any of the three types of inputs and provide processed video to all of the outputs. You can preset the HDTV output to provide the required format (for example, 1080i or 720p) for production. If the precedence of all the inputs is set the same (for example, if all of the Auto Detect Setup options are set to Normal as shown below), the the priority of switching is defined by the menu list order.	X75HD with these options: • X75OPT-A3D analog video input option • INT-EX6X1 (16 channel video wideband distribution amplifier)



Parameter Paths
Video Setup > Routing Setup > I/P Video Mode > Auto Detect
Video Setup > Routing Setup > Auto Detect Setup > Analog In > Normal
Video Setup > Routing Setup > Auto Detect Setup > SD 1 In > Normal
Video Setup > Routing Setup > Auto Detect Setup > HD 1/HD-Fiber In > Normal

Table 3-8. Critical Input Video Processing for Satellite/Microwave Reception

Description	Products
The X75HD auto-detects and then switches HD-SDI main and backup receivers (with an SDTV backup receiver) through the video processing engine to provide multiple types of outputs. Main (primary) and backup (secondary) HDTV receivers provide inputs which are automatically switched and processed to the required output format. A tertiary SDTV receiver provides a backup if both HDTV receivers do not have outputs.	X75HD-AV with X75OPT-A3D analog video input option



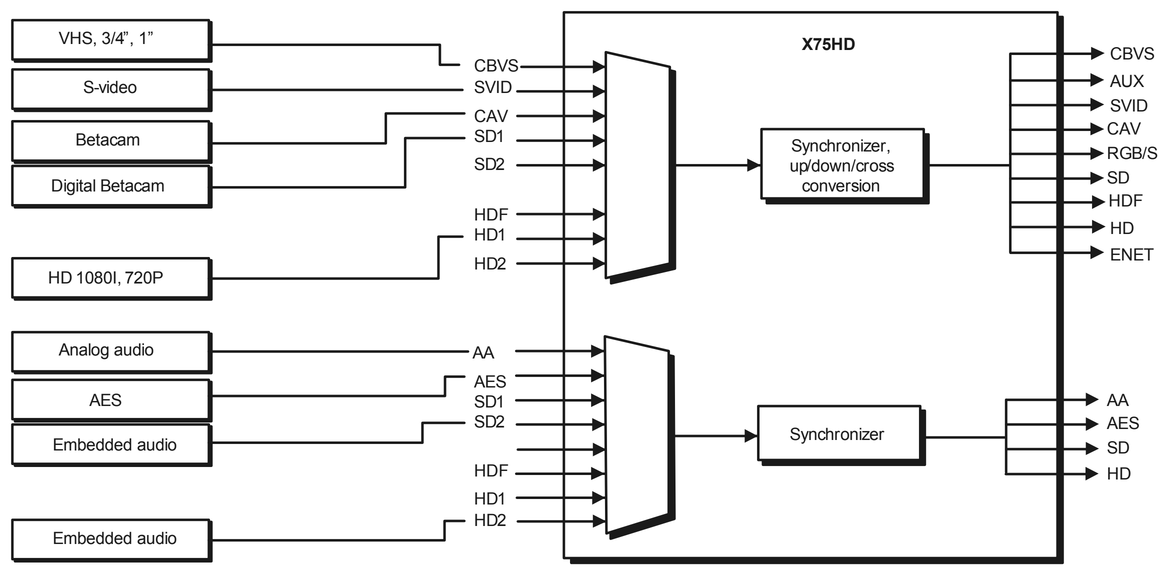
Parameter Paths
Video Setup > Routing Setup > I/P Video Mode > Auto Detect
Video Setup > Routing Setup > Auto Detect Setup > HD 1/HD-Fiber In > Highest
Video Setup > Routing Setup > Auto Detect Setup > HD 2 In > High
Video Setup > Routing Setup > Auto Detect Setup > SD 1 In > Normal
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-Aud Follows Vid > On
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD 1 > AES 1a/1b
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD 2 > HDX 1/2
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-SD 1 > SDX 1/2

Table 3-8. Critical Input Video Processing for Satellite/Microwave Reception *(Continued)*

Additional Factory Default Settings
Audio Setup > Routing > Output > AA Out1 > SRC1a
Audio Setup > Routing > Output > AA Out2 > SRC1b
Audio Setup > Routing > Output > AES1 OutA > SRC1a
Audio Setup > Routing > Output > AES1 OutB > SRC1b
Audio Setup > Routing > Output > SMX/HMX 1> SRC1a
Audio Setup > Routing > Output > SMX/HMX 2> SRC1b

Table 3-9. Input Video Processing for News Production

Description	Products
The X75HD selects and accepts inputs from various composite, SD-SDI or HD-SDI tape machines, and then sends the signal through the video processing engine to provide multiple types of outputs. Select and convert any tape format to the required output format.	X75HD-AV with X75OPT-A3D analog video input option



Parameter Paths
Button Shortcut: Video In (select an option) or Video Setup > Routing Setup > All Out Sel > (select one of:) M-Path/Composite/S-Video/CAV/SD 1/SD 2/ HD Fiber/HD1/HD2
Button Shortcut: Audio In (select an option) or Audio Setup > Routing > Audio In Src Select > (select one of:) Analog, AES, SD, HD

X75 Video and Audio Converting

Table 3-4 describes a common video and audio converting application, using a wrap-around for tape transports. (The X75OPT-HDDUOCON software key option is required for this application.)

NOTE

Many input and output choices are possible. This example is based on SD 1+AES1 inputs for up-conversion and CVBS+AA (analog audio) outputs for down-conversion.

Table 3-10. Wrap-Around for Tape Transports

Description	Products
The X75HD provides conversion and processing for video and audio for HDTV and all SDTV formats. Video and audio connections through the X75HD provide conversion and synchronization (along with time base correction, if required) for standard definition and high definition tape transports. This example uses SD1-to HD output and HD1 input to SD1 output with embedded audio.	X75HD-AV

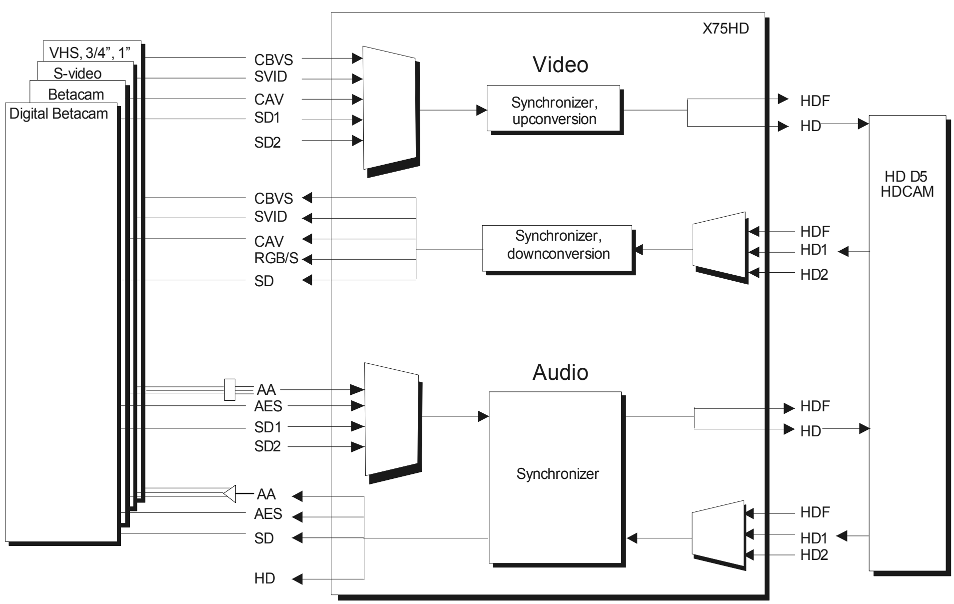


Table 3-10. Wrap-Around for Tape Transports *(Continued)*

Parameter Paths
Video Setup > Routing Setup > Video M-Path > HD Out Sel > SD 1
Video Setup > Routing Setup > Video M-Path >SDI 1 Out Sel > HD 1
Audio Setup > Routing > Input > SRC1 Input Select > HDX 1/2
Audio Setup > Routing > Input > SRC2 Input Select > HDX 3/4
Audio Setup > Routing > Input > SRC3 Input Select > SDX 1/2
Audio Setup > Routing > Input > SRC4 Input Select > SDX 3/4
Audio Setup > Routing > Output > SMX/HMX 1 > SRC1a
Audio Setup > Routing > Output > SMX/HMX 2 > SRC1b
Audio Setup > Routing > Output > SMX/HMX 3 > SRC2a
Audio Setup > Routing > Output > SMX/HMX 4 > SRC2b
Audio Setup > Routing > Output > SD 1 Embedded Audio > SMX 1 Input 1
Audio Setup > Routing > Output > SD 1 Embedded Audio > SMX 1 Input 2
Audio Setup > Routing > Output > SD 1 Embedded Audio > SMX 1 Input 3
Audio Setup > Routing > Output > SD 1 Embedded Audio > SMX 1 Input 4 >
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > HD Out
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > HD Out
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC3 > SD Out1
Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC4 > SD Out2

X75 Bridging Router Switchers

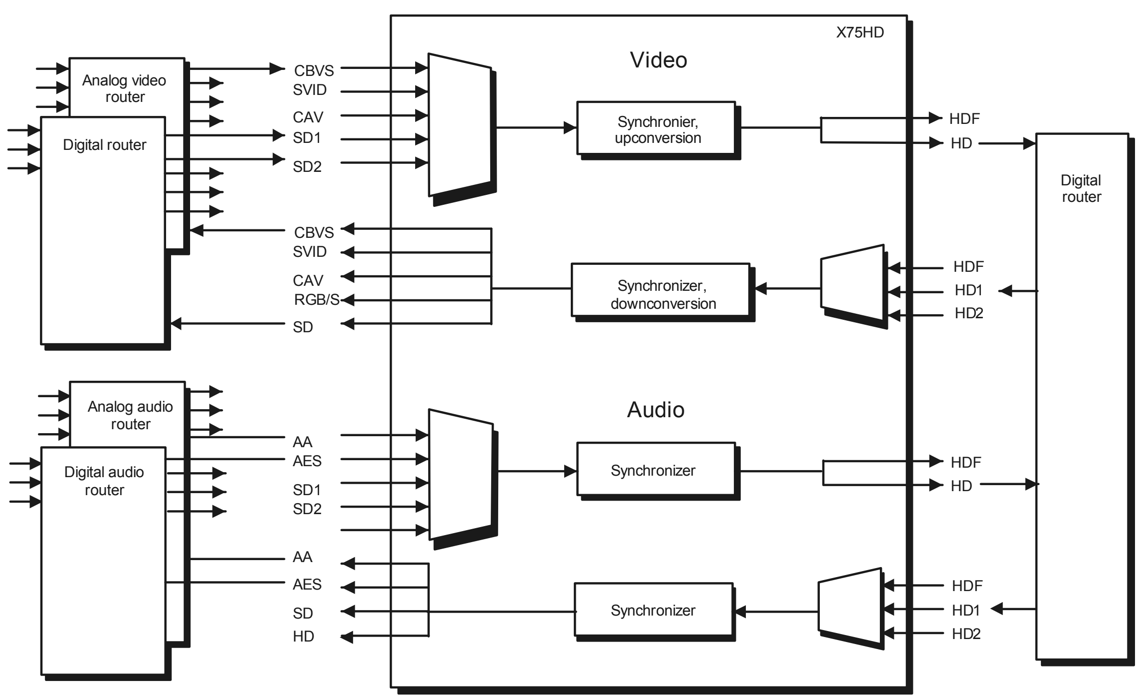
Table 3-5 describes a common application for bridging router switchers. To configure the X75HD for this application, use the parameter settings shown for “Wrap-Around for Tape Transports” on page 63.

NOTE

The X75OPT-HDDUOCON software key option is required for this application.

Table 3-11. Bridging Between Routing Switchers with Different Formats

Description	Products
The X75HD provides conversion and processing for video and audio for HDTV and all SDTV formats. Video and audio can be converted through the X75HD providing bridges between sources and destinations in hybrid facilities.	X75HD, Panacea and Integrator Routing Systems

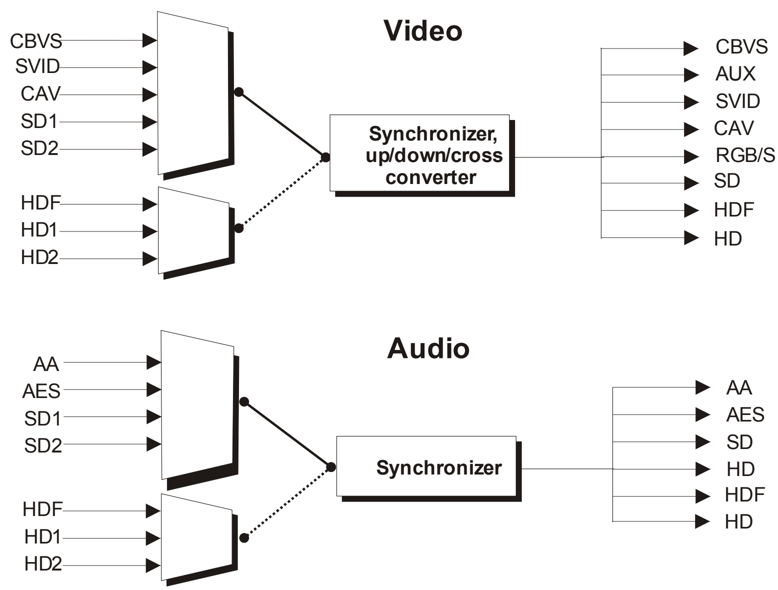


X75 Simulcast Switching

Table 3-6 describes a common application for simulcast switching of SDTV and HDTV signals.

Table 3-12. Simulcast Switching of Standard and High Definition Signals

Description	Products
You can configure the X75HD to do an A/B switch using any two inputs; all inputs are provided simultaneously. In this example, A=HD, and B=SD. Simultaneous HD and SD outputs are available. You can perform the A/B switch manually or by GPI.	X75HD-AV



Parameter Paths
Video Setup > Routing Setup > I/P Video Mode > Simulcast
Video Setup > Routing Setup > Simulcast > Input A > HD 1
Video Setup > Routing Setup > Simulcast > Input B > SD 1
Video Setup > Routing Setup > Simulcast > Simulcast Sel > Input A or System Config > Setup > GP-1 Function > Simulcast A/B
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-Aud Follows Vid > On
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD1 > HDX 1/2
Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-SD1 > AES1a/1b or SDX 1/2

Chapter 4

Installation

Overview

This chapter contains the following information:

Checking the Packing List

Before unpacking your product, read the "Unpacking/Shipping Information" on page xv.

Standard Items

The following items are included with every X85-3G/X85HD/X75SD system:

- One X85-3G/X85HD/X75SD Multiple Path Converters and Frame Synchronizers
- One AC power cable (773-254 or 773-505)
- Two rear support brackets (741-983A) and corresponding hardware
- Two cable relief support brackets (164-000306-00) and one corresponding cable relief bar (164-000305-00)

The following items are only included with X85-3G/X85HD/X75SD-AV and -LCAV systems:

- Two 2x7 analog audio terminal blocks (134-000228-00)
- Eight-channel audio module with X75OPTCAB-8-C breakout cable

Or

- Sixteen-channel audio module with X75OPTCAB-16-C and X75OPTCAB-8-C coax breakout cables

Optional Items

You may have additional items included in your shipment if you have ordered any of the available options or upgrades. See page 9 for a list of the available options.

Replaceable Parts Kit

The replaceable parts kit (X75SPR-KIT) includes the following items:

- 2 fans
- 4 stackers
- 1 power supply with no connectors
- 1 shaft encoder

Preparing for Installation

Prior to installing your system, ensure that certain environmental and electrical conditions are met.

Meeting Electrical Requirements

The X85-3G/X85HD/X75SD power supply has a universal input of 100-240 VAC at 47 to 63 Hz (nominal). There is no voltage selector switch. Prior to operation, ensure a proper power supply source is available.

Table E-28 and Table E-29 on page 425 describe the power consumption of individual components and system packages. These ratings refer to the total module power consumption (excluding that of the power supply) allowable within an X85-3G/X85HD/X75SD frame. The limits are based on the ability of the unit to dissipate heat over a temperature range of 41° to 95°F (5° to 35°C).

Each frame has space for two power supplies; however, a single power supply can meet the requirements of a fully-loaded frame. An optional second power supply can be purchased to provide full backup redundancy. See “Installing a Redundant Power Supply” on page 383 for more information.

Meeting Environmental Requirements

X75 and X85 units are cooled by forced air drawn in from the front, and exhausted through the rear. There must be free passage for air flow at the front and back of each unit to allow for adequate ventilation. Take care to select a dry, well-ventilated location with a minimum of dust.

X85-3G/X85HD/X75SD units are designed for mounting in a standard 19-in. (48-cm) rack using front-mounting ears and rear support brackets, occupying a 1RU vertical space of 1.75 in. (4.4 cm).

When installing an X75 or X85 in a rack, ensure that there is adequate space behind the mounting ears and clearance for the rear connecting cables. Allow about 10 inches (25 cm) of slack in the rear connecting cables for frame access and maintenance.

CAUTION

To ensure proper ventilation and to prevent overheating, keep the front panel closed.

After unpacking the frame, and before installing into a console or rack, allow at least 30 minutes for temperatures to equalize and to eliminate any condensation that may have developed. X75 and X85 frames require an ambient temperature of between 41° and 95°F (5° to 35°C), with a relative humidity of 10-90% (non-condensing). Proper operating temperatures can be maintained only when the front panel is properly installed.

Rack Mounting

Although the front-mounting ears provide the main support for the X85/X75 within a rack, you must install arms, brackets, and a cable relief bar at the rear of the unit to support the weight of cabling and frame stacking. The following procedure describes how to install the rack supports.

1. Locate the support package in the box, consisting of two support arms, two brackets with screws, a tie bar, and tie bar screws. (See Figure 4-1.)

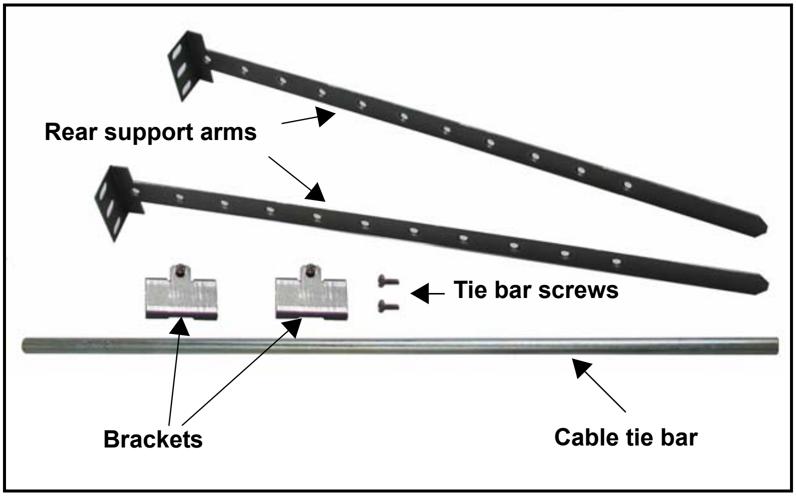


Figure 4-1. Rack Support Brackets

2. Attach the brackets to the sides of the frame using the screws that are provided. (See Figure 4-2 on page 82.)

CAUTION

To prevent damage to components inside the frame, do not use screws longer than those provided.

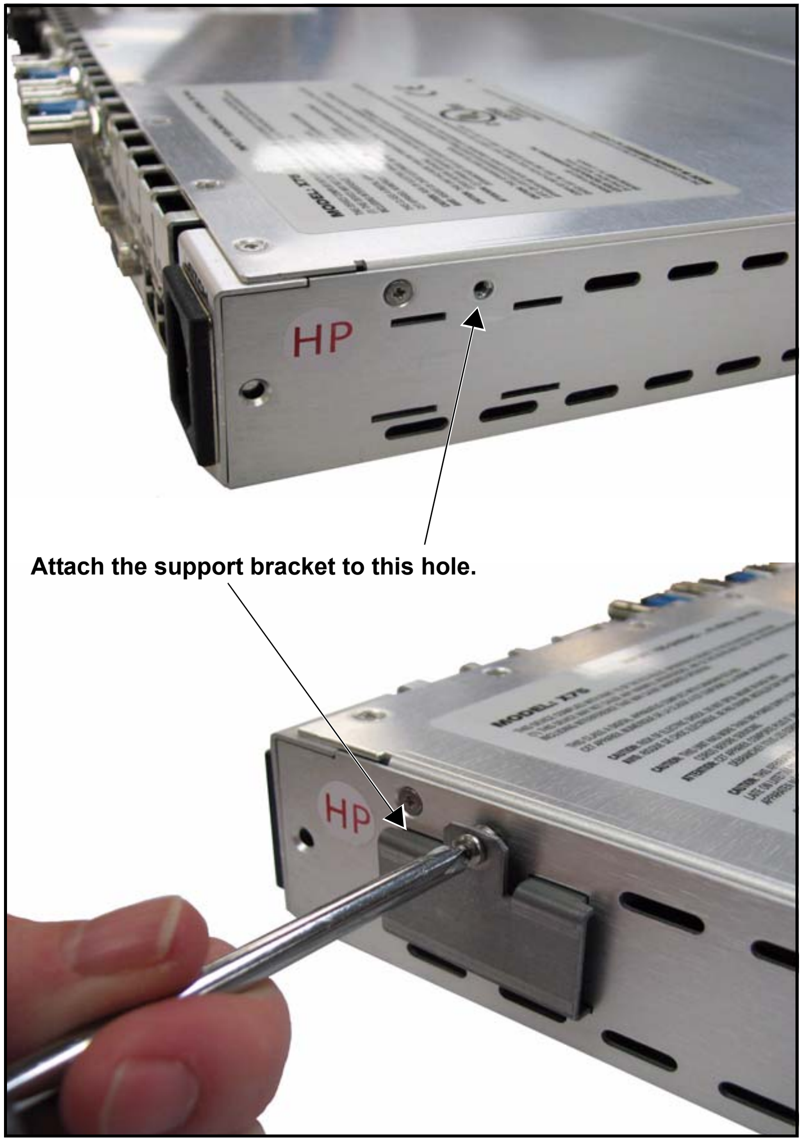


Figure 4-2. Bracket Installation

3. Attach the cable relief bar between the two support arms using the screws that are provided.

   You can secure the cable relief bar through any of the screw holes on the arm. (See Figure 4-3 on page 83.)

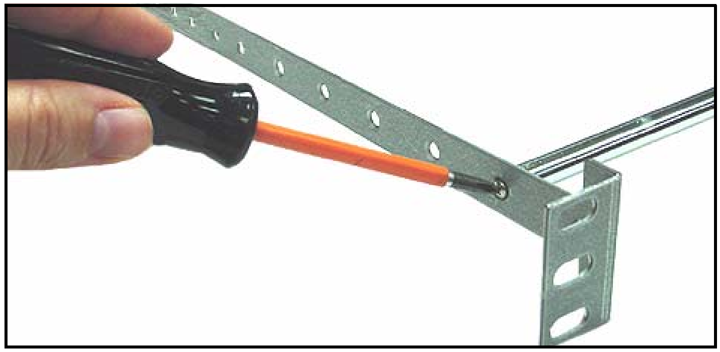


Figure 4-3. Attaching the Cable Relief Bar

4. Push the X85/X75 into the front of the rack, and attach the frame's front-mounting ears to the rack using the appropriate screws (not provided).
5. Slide the two arms into their slots from the back of the frame and attach the arms to the back of the rack (Figure 4-4).



Figure 4-4. Installed Support Arms

NOTE

In the event of a power supply failure, you can slide the X85/X75 forward and remove the partial lid for maintenance. Consider providing extra slack in your cords for this purpose.

Making Cable and System Connections

Some connections to the X85-3G/X85HD/X75SD are provided via supplied breakout cable(s), while others are made directly to the frame via single-link cabling.

When making cable connections, maintain approximately 10 in. (25 cm) of slack in the rear connecting cables (wrap or tie extra cable around the cable relief bar). This allows you to pull the frame out from the rack for servicing without needing to remove any cable connections.

A wide variety of optional breakout cables are available for the X75 and X85. See "Cables and Pinouts" on page 263 for details.

Video Connections

The X85HD module (unlike the X75HD module) processes both SD and HD signals. Because of this, X85HD parameter names often include the term **SDI** to indicate functions that operate through the X85HD module, where the X75HD parameters would include the term **HD**. Parameter names that include **SD** indicate functions that operate through the main processing module of the frame. Thus, **SDI** connections appear at the rear of the X85HD module; **SD** connections are located below the audio connectors, directly behind the main processing module.

The following connectors are direct single-link video connections (not via breakout cables) visible on the rear of the X85 and X75 frames.

Serial Digital Inputs and Outputs

SD In 1 and **SD In 2** accept serial digital ITU-R BT.601 video and embedded audio data at a rate of 270 Mb/s. **SD In 1** has a relay bypass capability to **SD Out 1**.

These BNC connectors provide the processed and synchronized serial digital ITU-R-BT.601 video and embedded audio at an output rate of 270 Mb/s.

HDTV Serial Digital Inputs and Outputs (X85)

The X85 provides **SDI In 1**, **SDI In 2**, **Fiber In 1**, and **Fiber In 2** as HDTV inputs (the module also provides SD processing on SD 1 and SD 2). HDTV outputs are **SDI Out 1**, **SDI Out 2**, **Fiber Out 1**, and **Fiber Out 2**. Depending on the mode used, each HDTV output can be assigned its own content.

HDTV Serial Digital Inputs and Outputs (X75)

Unlike the X85, the X75HD module provides three HDTV video input connectors: **HD-Fiber**, **HD In1**, or **HD In2**. There are three available outputs: **HD Fiber**, **HD Out1**, and **HD Out2**. All three outputs contain the same content.

Genlock Input

X85 and X75 models accept NTSC, PAL-B and Tri-Level Sync as the reference sources to provide the stable clock-to-output signals. The two Genlock BNC ports can be set either to **Loop-Thru** or **Split** operation. You can select any feed for the Tri-Level Sync, but in **Split** mode operation, you must select the port at which the signal is connected. To do this, follow **Reference Setup > GL Source Config.** All other genlock parameters are accessible in the **Reference Setup** menu.

There are three genlock connection modes: **Loop-thru**, **Split-525**, and **Split-625**.

- **Loop-thru** disconnects the internal terminations, connects the loop-through path and feeds the looped signal to the genlock subsystem
- **Split-525** disconnects the loop-through path and connects the terminations to both ports (the genlock source becomes the 525 Genlock BNC connector)
- **Split-625** disconnects the loop-through path and connects the terminations to both ports (the genlock source becomes the 625 Genlock BNC connector)

The genlock signal must be a stable, time base-corrected source, such as color bars or black burst. You can choose one of the following reference sources for the frame in **Reference Setup > Genlock Lock Source**:

- **External** reference input (either color black or tri-level sync)
- **Freerun** (the internal clock generated by the X85/X75)
- Any video input, including **SD 1**, **SD 2**, **HD**, or **Analog Video** on the X75**, or SD 1**, **SD 2**, **SDI 1**, **SDI 2**, **Fiber 1**, **Fiber 2, or Analog Video** on the X85.

  When the input video is selected as the reference source, the unit runs in one clock system; therefore it is in the *delay* mode rather than the synchronization mode.

The **GL Standard Set** parameter selects the operational video standard mode for the genlock circuitry. You can manually force it to a specific standard to match the source being fed into the **Genlock** port, or set it to **Auto** to let the X85/X75 automatically detect and configure its circuitry.

When a valid signal is connected to the genlock input, all video outputs from the X85/X75 will be genlocked to this signal. When this occurs, the **Genlock** LED will be lit. When no external reference is supplied to the genlock input, the unit will operate using its own internal clock source.

Component Analog Video Outputs

These three BNC connectors, labeled **B-Y**, **R-Y**, and **Y Out**, are used to output the signals to analog component devices, such as Betacam VTRs.

Composite Video Output

The BNC connector, labeled **Composite Out**, provides processed, synchronized versions of any of the input signals.

DVI Output

This connector provides up to 330 MHz bandwidth signal and supports 1080i/59.94, 1080i/50, and 720p/59.94, and 720p/50 outputs. From this output, connect the optional X75OPTCAB-DVI DVI-D to DVI-D (digital, single-link) cable to your DVI monitor.

Equipment connected to the X85 DVI output may take up to three seconds to lock when switching between the sources for the DVI output. For example, the transition could be clean when switching the DVI output from SDI 1 Out to SDI 2 Out, but take between 1 and 3 seconds when switching from SDI 2 Out to SDI 1 Out. This is normal behavior.

NOTE

On the X85, the signal on the DVI output can be selected from either of the SDI 1 Out or SDI 2 Out streams. As such, the contents on the DVI output is slaved to the source selection made for the corresponding SDI *x* output.

Composite Video Input

The **Cmpst In** BNC connector accepts a composite 1 V pk-to-pk 75Ω video signal. The input video signal must be direct color or monochrome (such as from a satellite feed or live camera).

S-Video Input

This four-pin mini-DIN connector, labelled **S-Video**, is used for S-video (Y/C) signals, such as from an S-VHS or Hi-8 device. The internal time base corrector automatically processes any signal received at this port.

Component Analog Video Inputs

These three BNC connectors, labeled **Y In**, **R-Y In**, and **B-Y In**, are used to input the signals from analog component devices, such as Betacam VTRs.

If component analog video input is not needed, the **CAV-Y In** connection can be reassigned as a second composite video input with the **CAV-Y Composite** option in the **Video Setup/Analog Input/Proc** menu (see “Chapter 8: Video Configuration” on page 167).

Audio Connections

A variety of audio packages are available, as shown in Table 4-1.

Table 4-1. Audio Connection Packages

Model	Features
• X75HD-AV • X75HD-LCAV • X85HD-AV • X85HD-LCAV (all with X75OPT-AS-16)	• 4 analog mono channels in and out • 5 AES in and out • SDTV embedded (4 groups) • HDTV embedded (4 groups)
• X75SD-AV models • X75SD-LC-AV (both with X75OPT-AS-8)	• 4 analog mono channels in and out • 2 AES in and out • SDTV embedded (4 groups) • HDTV embedded (4 groups)
X85-3G-AV with X75OPT-AS-32	• 8 AES in and out • SDTV embedded (4 groups) • HDTV embedded (4 groups)

DARS Inputs

The DARS input is available on the DB-26 connector.

The **DARS Bal/UnBal Sel** parameter (**Audio Setup** > **Input Setup** > **AES & DARS Audio**) selects between the unbalanced (coax) and balanced (XLR) type of connection. Primarily, the DARS (Digital Audio Reference Signal) is used for the audio synchronization.

AES/EBU Outputs

The **AES1** and **AES2** outputs are available on the DB-26 connector.

The **AES3**, **AES4,** and **AES5**; and **AES6**, **AES7**, and **AES8** outputs are available on the DB-44 connectors.

Both the unbalanced (coax) and balanced (XLR) AES audio signals are present at all time on both D-Sub connectors. The **AES*x* Bal/UnBal Sel** parameters (**Audio Setup** > **Input Setup** > **AES & DARS Audio**) select between the unbalanced (coax) and balanced (XLR) type of connection. Only one input connection type is supported.

Analog Audio Inputs and Outputs

Four channels (two stereo pairs) of analog audio inputs and outputs are supported on the 8- and 16-channel audio modules (no analog audio is supported on the 32-channel version). The analog audio input and analog audio output connectors are labelled **In CH1** to **In CH4**, and **Out CH1** to **Out CH4**, respectively. Each balanced analog audio input channel can be configured as 600Ω or high impedance.

Two analog audio receptacles (included with purchase of an X75OPT-AS-16 or X75OPT-AS-8 module) must be plugged into these connectors before configuration. See "X75OPT-AS-32, X75OPT-AS-16, or X75OPT-AS-8-L Audio Limiters" on page 21 for more information.

Remote Control Ports

Supported remote control methods include the following:

- 10Base-T or 100/Base-T Ethernet (used for control through a TCP/IP-based network) using a CCS application such as Pilot or Navigator, or using a controller such as the X75-RCP remote control panel or an X85-3G/X85HD/X75SD local control panel
- Web browser program such as Internet Explorer™ or Netscape™
- SNMP (Simple Network Management Protocol) and third-party control software through CCS Protocol
- GPI (General Purpose Interface) input/output used for remote triggering of functions such as Freeze or triggering of external devices

Ethernet Ports

The 10/100Base-T Ethernet connector, labelled **Ctrl/Strm**, connects X85-3G/X85HD/X75SD models to a TCP/IP-based network for remote control and status monitoring. Web-browsing software, an X75-RCP remote control panel, or a frame-mounted local control panel then control the unit. See "Configuring for HTTP Control via Web Browser" on page 156 for details about controlling the unit from your Web browser.

When using Ethernet, you must configure the IP Address, Subnet Mask, and Default Gateway settings of the unit for your network; your network administrator can provide you with these settings. The network settings are located in the **System Config > Setup** menu.

When all the changes are made, you must use the **Save IP** function (**System Config > Setup**) to actually save the changes in non-volatile memory.

A second port, labelled **Streaming**, is activated when the optional X75OPT-STR module is installed. For more details, see “X75OPT-STR Streaming Video Module” on page 31.

Chapter 5

Operation via Front Panel Controls

Overview

This chapter describes the main areas of the front panel, and provides the following general descriptions:

This chapter does *not* give specific descriptions about available menus, submenus, parameters, or options. See the *X85/X75 Parameter List* html file available from our website, or from the accompanying *X85/X75 System and Control Panel Documentation CD-ROM*.

Some limited control information (such as information on video and audio proc amp status LEDs, and audio proc amp channel mappings) can be found in the following chapters:

Front Panel Description

The front panel is divided into several areas for control and monitoring, including the following:

- VFD screen for viewing menu options, selections, feedback, and device information

  Changes to the display intensity and screen saver functionality can be made within the **Setup** submenu (press the **Option** button) in order to prolong the life of the VFD
- Control knob and buttons for scrolling, selecting, and setting menu options

  The push and turn shaft encoder (knob) is used for menu navigation and selection, and for coarse and fine parameter adjustment; the knob direction can be changed to your preference from within the **Setup** submenu (press the **Option** button)
- Programmable and device-dedicated control buttons
- Status and alarm LEDs for monitoring the current mode and operating conditions of the unit

Information about each of these areas is available in this chapter.

Using the Control Knob and Menu Control Buttons

All menus and device settings for the X85/X75 can be selected and configured by using the control knob and menu control buttons. Figure 5-1 shows the location of the control knob and various menu control buttons on the device. Use these items to open and navigate menus, scroll through and select options, and adjust various parameters and settings.



Figure 5-1. Control Knob and Menu Control Area

Setting the Direction of the Control Knob

If desired, you can change the direction of the control knob. To do this, press the **Option** button, open the **Setup** menu and then select the **Shaft Direction** parameter.

Set the direction of the knob to either **Clockwise = Up** or **Clockwise = Down**.

Using Multi-Function Buttons

Many of the buttons on the X85-3G/X85HD/X75SD control panel are multi-functional, and can have up to three functions assigned to them. To select a certain function from a multi-function button, perform one of the following steps:

- Press the desired multi-function button.

  The assigned default function is written in *black* text on the button face, either near the top or in the middle of the button.

- Press **Shift** and the desired multi-function button simultaneously.

  The assigned function is written in *red* text on the button face near the top of the button.

- Press **Ctrl** and the desired multi-function button simultaneously.

  The assigned function is written in *blue* text on the button face near the bottom of the button.

Navigating Through the Menus

There are up to eight main menu items available, depending upon the options you have ordered. Each of them opens up into several layers of submenus and parameter options that you can scroll through and edit as required. Table 5-1 briefly describes each of the main menu items.

Table 5-1. X75 Main Menu Items

Menu Name	Menu Description
Video Setup	Configures and controls the video settings
Audio Setup	Configures and controls the unit’s audio settings
Video/Audio Timing	Sets the audio and video timing for correcting lip sync
Reference Setup	Configures and controls the genlock and other reference settings
System Config	Configures settings of the initial setup parameters
High End Streaming	Configures the high-end streaming option
Global Frame Rate	Sets the unit’s frame rate per second
SD Operating Standard	Provides a read-only view of the selected or detected SD operating standard
HD Output Standard (X75) SDI 1 Output Standard (X85)	Provides a read-only view of the selected HD output standard
SDI 2 Output Standard (X85)	Provides a read-only view of the selected HD output standard

To navigate through the menus of an active system, follow these steps:

1. With the **Main** menu displayed, rotate the control knob to scroll through the menu items.
2. Press **Enter** to open a selected submenu.
3. Scroll through the options and parameters using the control knob, and then press **Enter** to make a selection.

   See “Changing Parameters” on page 96 for more information.
4. Press **Exit** to go back a step in the menu structure.

Changing Parameters

Once you have selected an option from a particular menu or submenu, use the control knob on the front panel to set the new value for the parameter by following the methods described below.

Also see "Configuring Network Settings" on page 146 and "Remotely Controlling X85/X75 Systems" on page 153.

Setting Discrete Options

The control knob cycles through discrete parameter and value options (such as **Auto**, **On**, **Off**). Depending on the parameter type, it will either wrap or clip when the control knob reaches the end of the option list.

- A wrapping parameter returns to the beginning of its range/list of options after you have scrolled through all of them.
- A clipping parameter requires you to scroll back through the range/list of options to return to the beginning of the list.

To set a discrete parameter option, follow these general steps:

1. Navigate to the required menu or submenu, and select a parameter.
2. Highlight a parameter with the control knob, and then press **Enter**.
3. Press **Exit** to accept your new value and return to the previous menu or submenu.

   Selected settings affect the output immediately.

Setting a Numeric Value

For parameters that have a numerical range of values, the VFD panel shows both a numeric and a visual representation of the range. Figure 5-2 shows this representation.

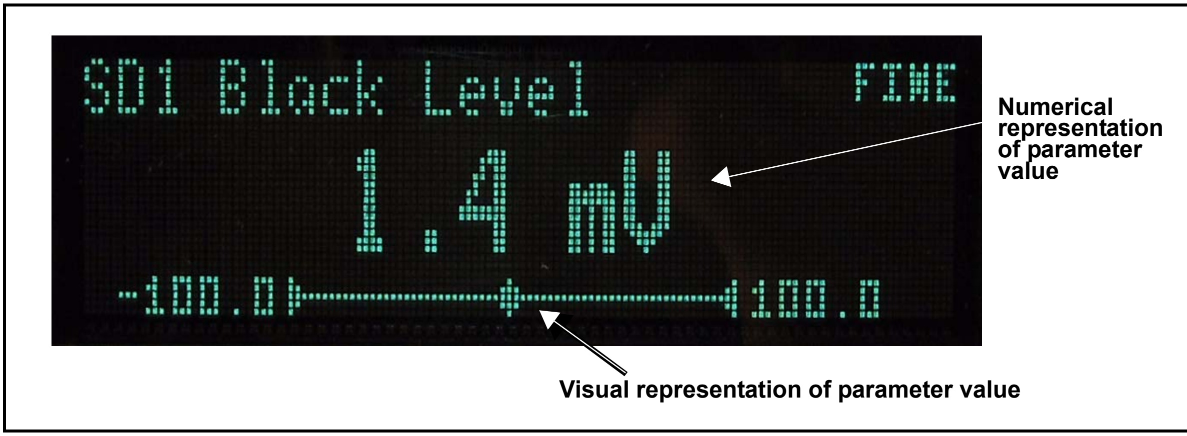


Figure 5-2. VFD Showing Numerical Range of Values

To set a parameter with a numerical value, follow these general steps:

1. Navigate to the required menu or submenu, and then select a parameter.
2. Change to **Coarse** adjustment mode if required (**Fine** mode is the default mode when you first enter a parameter adjustment screen).

   As an example, you can use the control knob to either adjust a value in increments of 0.02 (**Fine** mode) or 0.50 (**Coarse** mode).

   a. Press **Enter** to switch to **Coarse** mode where you can make large adjustments more quickly.

      When in Coarse mode, the **Enter** button lights up.

   b. Press **Enter** again to return to Fine mode.
3. Use the control knob to select a new value, and then press **Enter** to set it.

   Selected settings affect the output immediately.

4. To reset the parameter to its default value, press **Default** on the front panel.

   The **Default** LED lights up whenever the current value of the parameter is equivalent to the default value (whether you reached this value by pressing the **Default** button, or by scrolling to it with the control knob).

5. Press **Exit** to accept your new value and return to the previous menu or submenu.

Buttons

The following buttons are found on the frame-mounted local control panel or X75-RCP remote control panel:

See the *X85/X75 Parameter List* HTML document (available for download from our website or from the included *System and Control Panel Documentation* CD-ROM) for lists of all available menus and parameter options

Freeze Button

The freeze control freezes individual frames or fields of the incoming video source. The Freeze mode only affects the currently active video proc amp block.

NOTE

The Mute In Freeze option (Audio menu) specifies whether or not audio output will be muted while the video is frozen in Frame or Field mode.

To use the freeze shortcut, follow these steps:

1. Press the **Frz Mode** button and then select a mode for the incoming video.
2. Press **Take** to activate the selected Freeze mode and apply it to the incoming video.

   The **Take** button flashes while the Freeze mode is active.
3. Press the **Take** button repeatedly to toggle between live and freeze modes.

Video In/Video Proc Amp/Video Configuration Buttons

The X75 has four internal input video proc amps: HD, SD 1, SD 2, and Analog; the X85 has five internal input video proc amps: SDI 1, SDI 2, SD 1, SD 2, and Analog.

- HD-SDI 1, HD-SDI 2, and HD-SDI Fiber inputs share the HD video proc amp in the X75; SDI 1 and Fiber 1 share one proc amp, and SDI 2 and Fiber 2 share another proc amp in the X85.
- The SD 1 and SD 2 inputs have a dedicated video proc amp.
- Composite, S-video and CAV inputs share the analog video proc amp.

The four most commonly used video processing controls (**Luma, Black**, **Chroma,** and **Hue)** are available from the control panel as hot buttons.

NOTE

HD color correction has specific hardware and software requirements. See page 211 for more information.

The VFD briefly displays the selected video proc amp block when the **Ctrl** and **V Proc** buttons are pressed simultaneously.

Video Proc Amp Status LEDs

The **Video Proc** LEDs (Analog, SD, HD in the X75 and Analog, SD, and SDI in the X85) on the far right side of the front panel become active whenever the control panel is set to adjust the video parameters. They indicate which input video processing block is currently selected for the adjustments.

Audio In/Audio Proc Amp/Audio Configuration Buttons

When an X75OPT-AS-8, X75OPT-AS-16, or X75OPT-AS-32 module is installed, you can synchronize, delay, and process up to 8, 16, or 32 mono channels respectively in both the X85 and X75. Depending on the selected audio source group type, the numbered buttons 1 through 8/16 are mapped accordingly to allow quick access to its audio gain controls.

The audio source group types include the following:

- 4 mono channels of analog audio
- 2 AES channels for X75SD-AV modules (including X75OPT-AS-8); 5 AES channels for X75HD-AV modules (including X75OPT-AS-16); 8 AES channels for X75HD/X75SD modules with X75OPT-AS-32
- 16 channels from the SD-SDI demultiplexer
- 16 channels from the HD-SDI demultiplexer

When you press the **Audio In** button, the following are enabled:

- Selected inputs
- Channel LEDs
- Audio Input LEDs
- Mapped parameters

When you press the **Ctrl** + **A Proc** buttons, the following are enabled:

- Mapped buttons on the control panel
- Audio Proc LEDs

Tables 5-2 through 5-7 in the following pages describe the button mappings for single and multiple audio source configurations.

Single Source Configuration

Tables 5-2, 5-3, 5-4, and 5-5 show the mapped buttons on the control panels and the parameters affected when you use a single source of analog, AES, SD-SDI demuxed, or HD-SDI demuxed audio, respectively.

Table 5-2. Analog Audio Inputs Selected

Selected Inputs	Lit Channel LEDs	Lit Audio Input LEDs	Mapped Parameters	Mapped Buttons on Control Panel	Lit Audio Proc LEDs
AA1/2	1	Analog	Gain1, Gain2	1, 2	Analog
AA3/4	2		Gain3, Gain4	3, 4	

Table 5-3. AES Audio Inputs Selected

Selected Inputs	Lit Channel LEDs	Lit Audio Input LEDs	Mapped Parameters	Mapped Buttons on Control Panel	Lit Audio Proc LEDs
AES1	1	AES	Gain1, Gain2	1, 2	Digital
AES2	2		Gain3, Gain4	3, 4	
AES3	3		Gain5, Gain6	5, 6	
AES4	4		Gain7, Gain8	7, 8	
AES5	5		Gain9, Gain10	9, 10	

Table 5-4. SD Demuxed Audio Selected (SDX)

Selected Inputs	Lit Channel LEDs	Lit Audio Input LEDs	Mapped Parameters	Mapped Buttons on Control Panel	Lit Audio Proc LEDs
SD 1/2	1	SD	Gain1, Gain2	1, 2	SD
SD 3/4	2		Gain3, Gain4	3, 4	
SD 5/6	3		Gain5, Gain6	5, 6	
SD 7/8	4		Gain7, Gain8	7, 8	
SD 9/10	5		Gain9, Gain10	9, 10	
SD 11/12	6		Gain11, Gain12	11, 12	
SD 13/14	7		Gain13, Gain14	13, 14	
SD 15/16	8		Gain15, Gain16	15, 16	

Table 5-5. HD (SDI) Demuxed Audio Selected (HDX)

X85 Selected Inputs	X75 Selected Inputs	Lit Channel LEDs	Lit Audio Input LEDs	Mapped Parameters	Mapped Buttons on Control Panel	Lit Audio Proc LEDs
SDI Dmx 1/2	HD1/2	1	HD (X75) SDI (X85)	Gain1, Gain2	1, 2	HD (X75) SDI (X85)
SDI Dmx 3/4	HD3/4	2		Gain3, Gain4	3, 4	
SDI Dmx 5/6	HD5/6	3		Gain5, Gain6	5, 6	
SDI Dmx 7/8	HD7/8	4		Gain7, Gain8	7, 8	
SDI Dmx 9/10	HD9/10	5		Gain9, Gain10	9, 10	
SDI Dmx 11/12	HD11/12	6		Gain11, Gain12	11, 12	
SDI Dmx 13/14	HD13/14	7		Gain13, Gain14	13, 14	
SDI Dmx 15/16	HD15/16	8		Gain15, Gain16	15, 16	

Multiple Audio Input Source Configurations

Table 5-6 and Table 5-7 show the mapped buttons on the control panels and the parameters affected when you use multiple sources of analog, AES, SD and SD audio. Use the **Ctrl** + **A Proc** buttons to switch between the audio input types.

Table 5-6. Multiple Audio Inputs Selected

Selected X85 Inputs	Selected X75 Inputs	Lit LED Channels	Lit Audio Input LEDs	Mapped Parameters
AA1/2	AA1/2	1	Analog	Gain1, Gain2
AA3/4	AA3/4	2		Gain3, Gain4
AES1	AES1	3	AES	Gain5, Gain6
AES2	AES2	4		Gain7, Gain8
SD 1/2	SD 1/2	5	SD	Gain9, Gain10
SD 3/4	SD 3/4	6		Gain11, Gain12
SDI 1/2	HD 1/2	7	HD	Gain13, Gain14
SDI 3/4	HD 3/4	8		Gain15, Gain16

Table 5-7. Ctrl + A Proc Buttons Pressed

Lit LED Channels	Mapped Buttons on Control Panel	X75 Lit Audio Proc LEDs	X85 Lit Audio Proc LEDs
1	1, 2	Analog	Analog
2	3, 4		
3	5, 6	Digital	Digital
4	7, 8		
5	9, 10	SD	SD
6	11, 12		
7	13, 14	HD	SDI
8	15, 16		

Memory Button

Using the **Memory** button, you can store and restore custom settings for up to 100 presets on an SD card, or up to 10 presets in the X75 itself.

When storing each "package" of parameter settings, the memory will automatically save to a default file naming structure (**X75Save00** in an SD card, or **Preset Slot 1** in an X75). Files on the SD card can be renamed later, using Windows Explorer in a PC.

Once all of the available default filenames are "used up" you must delete the existing files, overwrite the existing files, or rename these files to make room for new default names.

Additional information about presets begins on page 122.

Table 5-8 compares the process of saving in the X85/X75 memory to that of saving in an SD card.

NOTE

A preset cannot be saved if there is not enough space, or the save protection tab is enabled, or the first 100 default names are used.

Table 5-8. Comparison of SD Card and X85/X75 Memories

Item	SD Card	X85/X75 Memory
Default naming convention	X75Save00, X75Save01, etc.	Preset Slot 1, Preset Slot2, etc.
Limit to number of saved presets	100 using default naming convention (up to 1000 can be visible when at least 900 have been renamed)	10 slots
Number of characters allowable in the filenames	24	63

File Naming Conventions

When using SD card presets, filenames have a limit of 24 characters (before the extension), must have the extension of ".psf", and must reside in the x75preset directory.

The following are some examples of usable and unusable file naming conventions (files are assumed to be in the /x75preset directory):

Example 1

"*my preset that has a long name.psf*"
(30 characters)

Result: Will not work (will not display)

Example 2

"*my preset w24 characters.psf*"
(24 characters)

Result: Will work

Example 3

"*non-proper ext.txt*"
(Extension is.txt)

Result: Will not work (will not display)

Example 4

"*test.txt.psf*"
(the last four characters are is ".psf", making the filename valid)

Result: Will work.

Formatting an SD Card

New SD cards must be formatted in an X75 or X85 before use. Follow this path to format a card:

1. Insert the card into the slot
2. Press the **Memory** button.
3. Select **SD Card Format**, and then press **Enter**.
4. Click **Yes** when prompted.

A confirmation message will appear briefly.

Saving a Preset

To save a preset, follow these steps:

1. Press the **Memory** button.
2. Select **Save Preset** to save the settings to the X85/X75, or press **SD Card Save Preset** to save the settings to the SD card.

   A list of ten slots appears in the X85/X75 memory, or up to 1000 filenames appear in the SD card.

   When saving to the X75, the slots are named **Saved Preset 1**, **Saved Preset 2**, etc., or simply **Empty Slot**. When saving to an SD card, the default filenames are **X75Save00**, **X75Save01**, **X75Save02**, etc., in addition to an option to create a new **Preset**.
3. Overwrite an old file, or, in the X75, scroll to the slot where you wish to save the entry, and then press the **Enter** button.
4. To save a new preset, scroll to a slot that is empty in the X75, or scroll to the **New Preset** option for the SD card, and then press the **Enter** button.

Restoring a Preset

To recall a preset, follow these steps:

1. Press the **Memory** button.
2. Select **List Presets** (to recall a setting stored in the X85/X75) or **SD Card List Presets** (to recall a setting stored in the SD card).
3. Scroll to the preset you would like to recall.
4. Press **Memory** again, or press **Enter**.
5. Scroll through the list, select **Restore Preset**, and then press **Enter**.

Renaming a Preset

To rename a preset, follow these steps:

1. Press the **Memory** button.
2. Select **List Presets** for items stored in the X85/X75, or **SD Card List Presets** for items in the SD card.
3. Scroll to the preset you would like to rename, and then press **Enter**.
4. In the new list, select **Rename Preset**, and then press **Enter**.
5. Press **Enter** again, and then select your digits to create a new name.
6. Press the **Exit** button when you are finished.

Deleting a Preset

To delete a preset, follow these steps:

1. Press the **Memory** button.
2. Select **List Presets** for items stored in the X85/X75, or **SD Card List Presets** for items in the SD card.
3. Scroll to the preset you would like to delete, and then press **Enter.**
4. Select **Delete Preset**, and then press **Enter**.

   The item is deleted from the list.

FAV1 and FAV2 Button

The **Fav1** and **Fav2** buttons store lists of favorite menu locations or controllable parameters. Using these buttons, you can “go to” a Favorite, delete a Favorite, or set a Favorite to be activated by GPI.

The procedures described below apply when the **1 Click Fav** capability is *not* enabled. If the **1 Click Fav** capability is enabled (see page 110), you can still access the full list of favorites by following this path: **Option** button > **Favorite 1** or **Favorite 2**.

NOTE

If the listed favorite is a menu mode (video M-Path), it cannot be set as a GPI parameter.

Adding a Favorite

To add a favorite, follow these steps:

1. Press **Fav1** or **Fav2**.

   A menu opens with the following options:

   - List Favorites
   - Add Favorite
2. Select **Add Favorite,** and then press **Enter**.

   The new favorite is added to the list, taking the name of the parameter or menu you were last working in.

Reaching a Favorite

To go to a favorite, follow these steps:

1. Press **Fav1** or **Fav2**.

   A menu opens with the following options:

   - List Favorites
   - Add Favorite

2. Select **List Favorites**.
3. Scroll to the desired favorite, and then press **Enter**.

Deleting a Favorite

To delete a favorite, follow these steps:

1. Press **Fav1** or **Fav2**.

   A menu pops up with the following options:

   - List Favorites
   - Add Favorite

2. Select **List Favorites**.
3. Scroll to the favorite you want to delete.
4. Press **Fav1** or **Fav2** again.

   A menu opens with the following options:

   - Delete Favorite
   - Move Up
   - Move Down
   - Set as GPI Parameter

NOTE

The **Move Up** and **Move Down** options are used to change the order of the presets.

5. Scroll to **Delete Favorite**, and then press **Enter**.

   A confirmation box appears stating that the favorite was deleted.

Setting a GPI Activation

To set a parameter to be activated by a GPI input signal, follow these steps:

1. Press **Fav1** or **Fav2**.

   A menu pops up with the following options:

   - List Favorites
   - Add Favorite

2. Select **List Favorites**.
3. Scroll to the favorite you wish activated by a GPI input signal.
4. Press **Fav1** or **Fav2** again to store the parameter.

   A menu opens with the following options:

   - Delete Favorite
   - Move Up
   - Move Down
   - Set as GPI Parameter

NOTE

The Move Up and Move Down options are used to change the order of the presets.

5. Scroll to **Set as GPI Parameter**, and then press **Enter**.

   An arrow (>) is placed just before the parameter name, indicating that the favorite is now set as a GPI-triggered parameter.

1 Click Capability

The Favorites feature has an additional **1 Click Fav** capability that makes it possible for you to directly access the first item in your favorites list, saving several steps. In this mode, the first item in the Favorites list appears on the screen directly, and you can execute it by pressing **Enter**.

To enable this feature, follow these steps:

1. Press the **Option** button.
2. Rotate the control knob and then select **Setup**.
3. Press the **Enter** button.
4. Scroll to **1 Click Fav**, select **Yes**, and then press the **Enter** button.

When **1 Click Fav** is enabled, the normal functionality of the **Fav 1** and **Fav 2** shortcut buttons (as described on page 108) is locked out. In this instance, access the Favorites by following this path: **Option** button > **Favorites 1** or **Favorite 2**.

Bypass Button

In the relay Bypass mode (SD only), no processing is applied to the **SD 1 In** video signal; the signal is instead passed directly to the **SD 1 Out** connector that is closest to the **SD 1 In** connector. (Only one of the two **SD 1 Out** connectors provides a bypass output.)

To activate the relay Bypass mode, press the **Bypass** button. Select **On** or **Off**, and then press **Enter**. When the unit is powered off, or forced by the user, the signal is passed straight through to the output without any processing. The **Bypass** button flashes when the Bypass mode is active.

A separate non-relay **HD Processing Bypass** is available. However, it is not accessible through the **Bypass** shortcut button. See "SDI (HD) Processing Bypass Mode" on page 194 for details.

Mono/Stereo Button

The **Mo**no/**St**ereo button located just left of the **Ctrl** button changes the audio channels control style. Pressing the **Ctrl** and **Mo/St** buttons toggles between the mono or stereo level and delay adjustments. This button is also mapped to the **Audio Control Style** parameter in the **Audio Setup > Global Audio Config** menu.

In mono control style, when adjusting the audio processing parameters such as the level, each numbered button is mapped directly to the individual gain controls. In stereo control style, even though a single button is pressed, both L/R channels are adjusted at the same time.

Noise Reduction Button

When an X85/X75 is equipped with the X75OPT-NR option, it provides superior noise handling and image enhancement features on SDTV video processing paths. Press the **NR** button for quick access to the noise reduction menu.

The **SDNR Insert** parameter under the **Video Setup > SD Processing > NR/Enhancement** menu selects a video input source to be processed by this block. All video output groups using the video input source selected by the **SDNR Insert** parameter will automatically have the SD noise reducer inserted into their video processing paths.

NOTE

If either the SD or HD noise reducer is enabled, the **NR** button will stay lit even if you exit the menu. In SD, the enabling parameter is **Noise Reduction;** in HD the enabling parameter is **HD NR Enable** (or as **SDI *x* NR Enable** in the X85**)**.

SD NR/Enhancement

The optional video noise and artifact reducer is based on the Harris AVARI (Advanced Video Artifact Reducer I) technology. This feature is capable of impulse noise reduction, Gaussian random noise reduction, compression "blockiness" and mosquito artifact reduction and the sharpening and softening of images.

The impulse noise reducer is particularly effective in reducing satellite noise. It automatically detects impulse noise and applies a median filter when necessary. To achieve the ideal setting, adjust the **Impulse Noise Level** control (via the **NR** button) to reduce more impulse noise, but not to the extent that excessive motion artifacts are generated.

AVARI technology uses a recursive 3D directional filter that reduces Gaussian noise and compression artifacts, which includes the ability to block artifacts and mosquito noise. For ideal effectiveness, adjust the **Noise/Artifact Level** control up to see more effect on filtering, but not to a level where excessive blurring is visible.

The directional softening/sharpening filter can be used in various applications. For example, the softening filter can be used as a compression pre-filter to reduce mosquito noise, and the sharpening filter can be used to enhance picture appearance. The **Soften/Sharpen** control provides this function; a negative value achieves a softening effect, and a positive value results in a sharpening effect. While adjusting these controls, the **Split Screen** feature may be used to compare the filtered video against unfiltered video.

The overall filter delay is approximately 1 line when the **Minimum Delay** parameter is set to **Yes**, and approximately 1 field when set to **No**. The overall performance is slightly better when **Minimum Delay** is set to **No**.

HD NR/Enhancement (X75)

The HD digital noise reduction and enhancement controls are included as a standard feature with the HD submodule and may be applied to the X75HD's HD outputs.

When equipped with the X75OPT-NR option, for the up-converted HD output signal, you can use either (or both) of the SD or HD noise reduction functions.

Test Signal Generator Button

An X85/X75 unit provides HDTV (8-bit) and SDTV (10-bit) internal test signals. These test signals are directly accessible through the **TSG** button. The SD Keyer and the test signals function share the same processing block. Using the **Keyer/TSGInsert** parameter in **Video Setup > SD Processing** or **SDI Processing > TSG**, you can select a video source to be processed by this block. All video output groups using the video input source selected at the **Keyer/TSG Insert** parameter will automatically have the Keyer/TSG inserted into their video processing paths.

The X85HD test signal generator is at **Video Setup > SDI Processing > SDI *x* >TSG**.

See the *X85/X75 Parameter List* in html for a complete list of the test signals available.

ARC (Aspect Ratio Converter) Button

The **ARC** button provides quick access to the **Variable** ARC controls to make custom settings. When making an aspect ratio conversion, you can choose an existing ARC viewing mode, or create your own custom settings. (To make any type of aspect ratio conversion, you must have one of the following:

- X75 equipped with an X75OPT-HDUPG HD module
- X75 equipped with an X85OPT-HDUPG HD module
- X85 frame

See page 196 for more information about aspect ratio conversion.

Timing Button

Using the **Timing** button, you can quickly access the currently selected video processing block's phase controls. When multiple input video sources are selected and processed, pressing the **Ctrl** and **V Proc** buttons allows you to switch between the processing blocks and leads you directly to the selected timing controls.

The **Proc** LEDs on the right side of the front panel and the display show the currently selected and active block.

- When the Analog processing block is selected, press the **Timing** button to access the **AVFS & Timing** submenu.
- When an SD processing block is selected, press the **Timing** button to access the **SD1 FS & Timing** or **SD2 FS & Timing** submenus.
- When the HD processing block is selected, press the **Timing** button to access the **HD Out V-Phase** parameter under the **Processing** menu, and press the **Exit** button to access the HD Out H-Phase control.

The timing controls for the down-converted signal can be adjusted with the **SD-ARC/HD Dn V-Ph** and **SD-ARC/HD Dn H-Ph** controls from the **Video Setup** > **Processing** menu.

NOTE

On the X85, if an H-phase or V-phase video timing adjustment is made to an **SDI*x* Out** signal and the same stream is routed downconverted into the mainboard, the **SD** outputs from the mainboard fed with the downconverted signal may exhibit a brief disruption as the video timing changes.

Option Button

The **Option** control panel shortcut allows quick access to certain parameters, some of which become enabled with the purchase and installation of various optional modules and upgrades.

To access the list of **Option** parameters, press the **Option** button, and then select one of the following items:

- **History**: The last ten parameters that you have viewed or modified appear chronologically in the **History** list. The most recent event appears at the bottom of the list. This list is deleted if the control panel loses its power.

- **Active Alarms**: This option lists the currently activated alarms.
- **Alarms Log**: The last 20 alarms (minor and major) are listed in the Alarms Log. This is a read-only list; it can only be cleared by disconnecting power to the control panel.
- **Configure Alarms**: Use this parameter to set the parameters for alarms on your network of X85/X75-enabled devices.
- **Favorite 1** and **Favorite 2**: Use these two lists to retain the ten most-needed parameters. With each parameter listing that you wish to save, press **Favorite 1** or **Favorite 2** from the **Options List**, and then select **Add**. The message “Item added” appears. See “FAV1 and FAV2 Button” on page 108 for more information.
- **Preset**: This shortcut leads you directly to items found in the **Memory** menu (see “Memory Button” on page 105).
- **MuteKeepAlive:** The X75HD/X75SD unit sends out a “keep alive” message at approximately every 15 seconds. The keep alive checks to determine if the device is still active and resides on the control network. The following options are available:
  - **No**: The keep alive message is broadcast every 15 seconds by the X75 unit to be discovered by the client control systems.
  - **Yes**: Suppresses the keep alive message unless it is requested by any client control system.

    If the X75 is re-powered with the **Mute KeepAlive** option set to **Yes**, a client device such as a remote control panel will not be able to discover the unit until the control panel is re-powered.
- **Mute Device:** Disables asynchronous messages or notifications to CCS clients (for example, NUCLEUS and CCS Navigator) to reduce network traffic
- **Home**: This option returns you to the **Main** menu.
- **Path**: Using this feature, you can establish the path of the parameter that you are currently viewing or adjusting. To obtain the path, select **Path** from the options list, and then press **Enter**. Rotate the control knob to view the entire path.
- **Lock Panel**: By selecting and entering this parameter, all card-edge controls are locked out, preventing accidental changes. To remove the Lock Panel function, press the **Default** + **Exit** buttons.
- **Preset Quick Select:** Recalls Presets 1 to 8 (see page 122)

- **SD ARC Quick Select:** Saves SD ARC quick selects (see page 124)
- **HD ARC Quick Select:** Saves HD ARC quick selects (see page 125)
- **Setup**: Contains a number of parameters that affect how your display screen operates (see "Display Screen Setup Parameters" on page 117).

More information on each of these control options can be found in the *Control Panels for X75 Systems Installation and Operation Manual*.

Rebooting Shortcut

To reboot the X85/X75 unit without removing the AC cord, press the SHIFT + CTL + NR buttons simultaneously.

Display Screen Setup Parameters

The display screen Setup parameters affect the way in which the display screen functions on your panel. These settings do not affect how parameters are seen on other panels.

To access the display screen Setup Menu, follow these steps:

1. Press the **Option** button.
2. Rotate the control knob and select **Setup**.
3. Press the **Enter** button.

The display screen Setup parameters are described in the following pages.

Scroll Mode

In **Wrap** mode, when you scroll through menus and non-numeric parameters, the module considers the list as a circular set of data. When the last parameter in the list is reached, the first parameter in the list immediately follows it. In **Don't Wrap** mode, the module stops when the last parameter in the list is displayed. To return to the first parameter, you must scroll through the entire list in the opposite direction. The **Scroll Mode** options globally affect all non-numeric parameters as they appear on the control panel where you have made this setting. Numeric values are not affected by Scroll Mode options.

Display Intensity

To accommodate different equipment room lighting conditions, you can set the panel to five levels of display intensity: 100%, 75%, 50%, and 25%.

Screen Saver Timeout

To extend the life of the display device, the screen saver automatically shuts off the display after a preset period of inactivity. Using the **Screen Saver Timeout** parameter, you can set the duration of inactivity after which the control panel display turns off, or you can disable the screen saver. The available time options are 5, 10, 20, and 30 minutes.

To exit the screen saver mode, press the control knob or any button. No parameters will be changed when you exit the screen saver mode.

Screen Saver Select

The screen saver can be set to either **Blank** or **Default**. The **Default** screen saver consists of a line of scrolling text.

Shaft Direction

Using this parameter, you can determine whether the clockwise rotation of the control knob moves a parameter list up or down. The setting of this parameter only applies to navigation, and does not effect the adjustment of numeric values. To make numeric values increase, the control knob must always be turned the knob clockwise. To make values decrease, you must always turn the knob counter-clockwise.

1 Click Favorite

The Favorites feature has an additional **1 Click Fav** capability that makes it possible for you to directly access the first item in your favorites list, saving several steps. In this mode, the first item in the Favorites list appears on the screen directly, and you can execute it by pressing **Enter**. To enable the **1 Click Fav** capability, select **Yes.** See page 110 for details.

Force DPS Protocol

By enabling this feature, you can access the Favorites and Presets of the X85/X75 from a remote control panel.

Backlite

This feature illuminates the X75's buttons in dark locations. Buttons that have been activated when the **Backlite** is enabled will now flash.

Status and Alarm LEDs

Table 5-9 shows the function and indications of the X85 and X75 control panel LEDs.

Table 5-9. Control Panel Leds

LED	Function	Condition	Meaning
Genlock	Indicates the current status of the external genlock source.	On	The control panel is configured to Auto Genlock and a stable genlock source is detected.
		Off	Genlock is not selected.
		Flashing	The genlock source is not stable or is missing.
EDH	Indicates the current configuration and status of Error Detection Handling in the input standard serial digital video stream. The EDH LED receives both SD and HD inputs for status reporting. For an EDH error count and other related information, follow: • **Video Setup > SD 1 Input > EDH** • **Video Setup > SD2/DV Input > EDH** • **Video Setup > SDI 1 Input > EDH > CRC** • **Video Setup > SDI 2 Input > EDH/CRC** • **Video Setup > Digital Output**	On	The EDH feature is monitoring the input video.
		Off	The EDH feature is turned off.
		Flashing	EDH detection is enabled and EDH errors have been detected, or the incoming SDI feed does not include EDH.
TBC	Indicates whether or not the composite input signal is timebase-corrected by the unit's TBC circuitry	On	The internal time base corrector is operating and correcting the input signal, usually for heterodyned signals from sources such as a VTR.
		Off	The internal time base corrector is not active (the unit may be in Sync mode).

Table 5-9. Control Panel Leds

LED	Function	Condition	Meaning
Autotrack	Indicates whether or not the audio Auto Track mode is enabled. (You can independently set each audio synchronizer to track the selected output video channel to auto compensate the propagation delay introduced in the processed video path. Also, you can add the additional delay with the Audio Delay controls. Follow this path: **Audio Setup > Input Setup > Delay**)	On	Any one of the I/O Delay SRC parameters in **Audio Setup > Global Audio Config > I/O Delay Config** is set to an option that is other than None.
		Off	The audio delay feature is turned off.
M-Path	Indicates whether or not the unit is in M-Path mode.	On	The M-Path mode is enabled (one or more input signals are selected and routed to the outputs).
		Off	The M-Path mode is not enabled; Simulcast mode is in effect.
Simulcast	Indicates when the unit is in Simulcast mode.	On	The Simulcast mode is enabled.
		Off	The Simulcast mode is not enabled; M-Path mode is in effect.
Major and Minor Alarm	Detects activated alarms from the enabled list of alarms found in the selected frame's parameters. (Local and remote control panels only detect alarms that are activated on X85/X75 models that are currently being accessed.)	On	Alarms are detected.
		Off	No alarms are detected.
Mem Active	Indicates activity on an inserted SD flash memory card.	On	The flash card is activated and should not be removed
		Off	There is no SD card activity.
Video Input	Indicates which video input is currently selected. (When more than one video source is selected and mapped to multiple output groups, the M-Path and corresponding video input source LEDs will light.)	On	The indicated video source is currently selected.
		Flashing	The selected input signal is absent,

Table 5-9. Control Panel Leds

LED	Function	Condition	Meaning
Audio Input	Indicates which input is currently selected.	On	The indicated video source is currently selected.
		Flashing	The selected input signal is absent
Video Proc	Indicate the current focus of video control.	On	A video parameter adjustment is being made.
		Off	No video adjustments are being made.
Audio Proc	Indicates the current focus of audio control	On	An audio parameter adjustment is being made.
		Off	No audio adjustments are being made.

Presets

X75 and X85 frames have a number of preset functions. The Preset Quick Select function is useful for general parameter settings, and includes eight possible preset slots. The X85/X75 also includes function-specific presets for SD ARC, HD ARC, and GPIs. In addition, presets are accessible *remotely*, using control panels, the Web Browser, and SNMP. There are ten slots available for remote saving and recalling from the main panel (eight of these ten slots are shared with the Preset Quick Select function). Also, 1000 or more presets are available using an SD card (see page 127 for details).

The different types of presets are described on the following pages:

- "Preset Quick Select" (below)
- "SD ARC Quick Select" on page 124
- "SDI ARC Quick Select" on page 125
- "GPI In Presets" on page 125
- "Remote Access to Presets" on page 126

Preset Quick Select

Before using the Preset Quick Select feature, you must first create presets that you can retrieve at a later time (only the first eight of the usual ten presets are available via the quick select function).

To save a preset for quick select, follow these steps:

1. Configure your X85/X75 with the settings you wish to save as a preset.
2. Press the **Memory** button (or press the **Options** button, and then select **Preset**).
3. Select **Save Preset**.
4. Select one of the first eight slots for the preset.

   The X75 pauses for a moment, then displays the message **Preset Saved**.
5. Repeat these steps for any additional presets you want to save.

The position of the slot you choose determines which buttons are used for the preset in the Preset Quick Select feature (see Figure 5-3 on page 123).

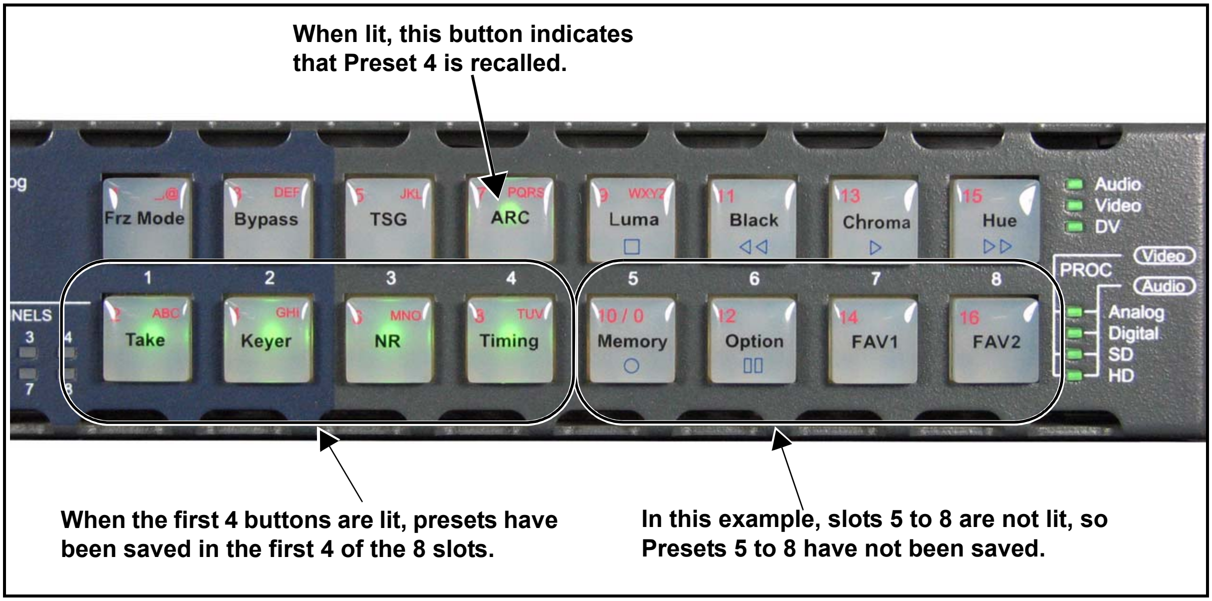


Figure 5-3. Example of Preset Slots Saved

To recall the presets you have saved, follow these steps:

1. Press the **Options** button, and then scroll down and select **Preset Quick Select**.

   Other functions on the panel are now locked out. As shown in Figure 5-3, the numbered pairs of buttons represent **Presets 1** to **8**.

   When the bottom button of a pair is lit, there is a preset saved to that slot. If the panel is in backlit mode, the top button will also light.

2. Select one of the two buttons in a pair to recall and activate the preset.

   After recalling a preset, the upper button lights, showing that this is the last preset restored. If the panel is in backlit mode, the top button flashes when it is selected.

To *exit* the Preset Quick Select mode, press the **Default** button and then the **Exit** button.

SD ARC Quick Select

NOTE

An HD submodule (X85OPT-HDUPG or X75OPT-HDUPG) is required to perform SD and HD ARC Quick Selects.

Before using the SD ARC Quick Select feature, you must first create presets that you can recall at a later time. Four slots are available.

To save an SD ARC preset for quick select, follow these steps:

1. Configure the SD ARC parameters that you want to save as a preset.
2. Select one of the four available **Preset** slots in **Video Setup > SD Processing > Presets > Save**.
3. Repeat these steps for any additional SD ARC presets that you want to save.

The position of the slot you choose (**Preset 1**, **2**, **3**, or **4**) determines which buttons are used for the SD ARC Quick Select feature.

Once you have saved your presets, follow these steps to recall the SD ARC Quick Select presets:

1. Press the **Options** button.
2. Scroll down to, and select **SD ARC Quick Select.**

   At this stage, other functions on the panel are now locked out. Figure 5-3 on page 123 shows the numbered pairs of buttons that represent **SD ARC Presets 1** to **4**. The bottom half of the first four buttons will always be lit regardless of how many presets are saved.
3. Select one of the two panel buttons in a pair to recall the SD ARC preset.

   After recalling a preset, the upper button lights, showing that this is the last SD ARC preset restored. If the panel is in backlite mode, the top button flashes when it is selected.

To exit the Preset Quick Select mode, press the **Default** button and then the **Exit** button.

SDI ARC Quick Select

Before using the SDI ARC Quick Select feature, you must first create presets that you can recall at a later time. (**SDI ARC**s are known as **HD ARC**s in the X75.) Four slots are available; all are routed to **Out 1** of the X85HD module.

To save an SDI ARC preset for quick select, follow these steps:

1. Configure the SDI ARC parameters that you want to save as a preset.
2. Select one of the four available **Preset** slots in **Video Setup > SDI Processing > SDI *x* > ARC > ARC Presets**.
3. Repeat these steps for any additional SDI ARC presets that you want to save.

The position of the slot you choose (**Preset 1**, **2**, **3**, or **4**) determines which buttons are used for the SDI ARC Quick Select feature.

Once you have saved your presets, follow these steps to recall the SDI ARC Quick Select presets:

1. Press the **Options** button.
2. Scroll down to, and select **SDI ARC Quick Select**.

   At this stage, other functions on the panel are now locked out. Figure 5-3 on page 123 shows the numbered pairs of buttons that represent **SDI ARC Presets 1** to **4**. The bottom half of the first four buttons will always be lit regardless of how many presets are saved.
3. Select one of the two panel buttons in a pair to recall the SDI ARC preset.

   After recalling a preset, the upper button lights, showing that this is the last SDI ARC preset restored. If the panel is in backlite mode, the top button flashes when it is selected.

To exit the Preset Quick Select mode, press the **Default** button and then the **Exit** button.

GPI In Presets

You can save and recall two presets for GPI inputs on the X75. Follow these steps to save and recall these presets:

1. Configure your X75 to the settings you want to save as **Preset 1**.
2. Press the **Memory** button, and then select **Save Preset**.

3. Select the first **Empty Slot,** and then press **Enter**.
4. Repeat steps 1 to 3 to save the second GPI preset.
5. Select **Preset Recall 1** at **System Config > Setup > GPI-1 Function.**
6. Select **Preset Recall 2** at **System Config > Setup > GPI-2 Function**

   When GPI 1 or GPI 2 is triggered, the associated presets are recalled and activated.

CAUTION

To prevent unexpected results, ensure that your GPI function settings are correct before you store them in the preset.

Remote Access to Presets

Remote access parameters to presets make it possible for remote client control devices such as remote control panels, the Web Browser, and SNMP to recall and save presets that are stored on the SD memory card and the LCP of the remote unit.

The following four parameters are used for SNMP on the X85/X75:

- Preset Load
- Preset Save
- Panel Preset Load
- Panel Preset Save

All four of these parameters are accessible via **Main Menu** > **System Config > Local Presets**. Table 5-10 on page 127 describes the four SNMP parameters.

Table 5-10. SNMP Parameters

Parameter Name	Purpose	Comments
Preset Load	Loads a preset on the controlling X75 from the SD card or the controlled panel presets	The controlled panel presets are specified with **<P#>** where # is the preset number **1** to **10**. Anything after the **<P#>** is ignored for the purpose of loading. If **<P#>** is omitted, the file name refers to a preset on the SD card. The **P** is not case sensitive.
Preset Save	Saves a preset on the controlling X75 to the SD card or the controlled panel presets	The controlled panel presets must be prefixed with **<P#>** where **#** is the preset number **1** to **10**. If no name is specified after the **<P#>**, the preset is saved using the current name for the slot, or a default name if there are no presets currently defined. Otherwise, the name of the preset will be whatever follows the **<P#>**. If **<P#>** is not specified, the preset will be saved to the SD card. The **P** is not case sensitive. When choosing a preset name, some symbols are not allowed in the SD card filename. The symbols between the following [ ] brackets cannot be used: [“ < > ? /\ |* :]
Panel Preset Load	Loads a preset (by ID) on the controlling X75 from the controlled panel preset	The value will always jump to **None** (**0**) once the preset is loaded.
Panel Preset Save	Saves a preset (by ID) on the controlling X75 to the controlled panel preset	The value will always jump to **None** (**0**) once the preset is saved.

The actual number of preset files saved to the SD card is limited only by the size of the files. However, the file list on the X75 control panel will only display up to 1000 items. The server parameter list will display whatever fits into 16 Kb (approximately 500 names, based on an average filename size of 30).

Although the name may not be in the list, you should be able to load the file by specifying the name directly in to the **Preset Load** parameter.

Chapter 6

Operation by Web Server Software

Overview

Once you have configured the networking parameters of the X85/X75, and connected it to the Ethernet network, you can control the unit through a standard Web browser. See “Configuring for HTTP Control via Web Browser” on page 156 for more information.

Controlling an X75 or X85 remotely from your PC through a standard Web browser gives you the same options for control and alarm monitoring as other local and remote control methods, without the additional costs of purchasing control panels or specialized software applications. Using a Web browser to control the X85/X75 does not require any special hardware or software.

The following topics are discussed in this chapter:

Launching the Web Server Software

To access the X85/X75, open a Web browser on your computer (supported browsers include Microsoft Internet Explorer 6.0, Netscape Navigator 7.2, and Mozilla Firefox 1.0, among others).

In the **Address**, **Location**, or **URL** field of your Web browser (the name depends on the browser), type `http://` followed by the **IP Address** of the X75HD/X75SD you want to control. For example, if the X75HD/X75SD is configured with the IP Address 10.0.0.1, enter the following location into your Web browser:

```
http://10.0.0.1
```

The Web browser then displays the Home page of the X75HD/X75SD Control interface (hereafter referred to as the "Web server"), as shown in Figure 6-1.

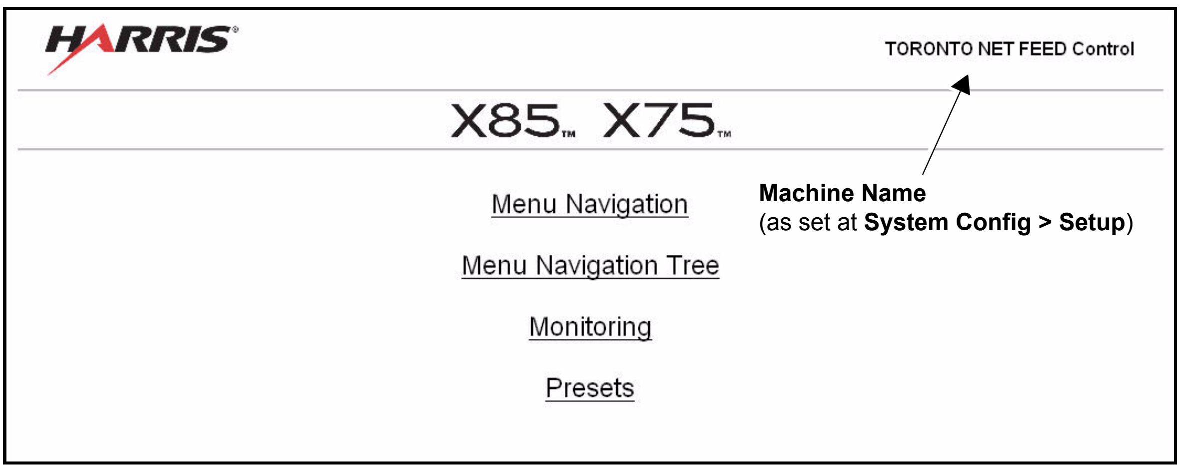


Figure 6-1. X75HD/X75SD Control Home Page for Web Server

The Home page provides three options:

- **Menu Navigation Tree** (see page 131)
- **Menu Navigation** (see page 137)
- **Monitoring** (see page 138)

Click an option to open the desired control page.

Controlling Devices

Click **Menu Navigation** from the Home page to open the **Main** menu page. The **Main** menu page provides access to all available X85/X75 menus and options. These menus mirror those menus that are accessible through the local and remote control panels.

NOTE

Web browsers do not automatically update when server information changes. As a result, your Web page may contain stale information. Using the Back and Forward buttons on your browser may also present you with stale data.

Before monitoring a device, be sure to click **Refresh** on your browser to get the latest information from the X85/X75 server.

Navigating from the Main Menu Page

The **Main** menu page lists several major submenus through which you can navigate to a required parameter/setting. Click a menu to open the corresponding configuration page. Continue to navigate through the resulting submenus until you reach the desired parameter.

The **Main** menu also has a number of individual parameters that can be set directly from this page. Click a parameter name from the **Main** menu table to change the value; a separate parameter configuration page will open.

Figure 6-2 on page 132 describes the **Main** menu page interface. Figure 6-3 on page 133 illustrates the sequence of pages that results during navigation.

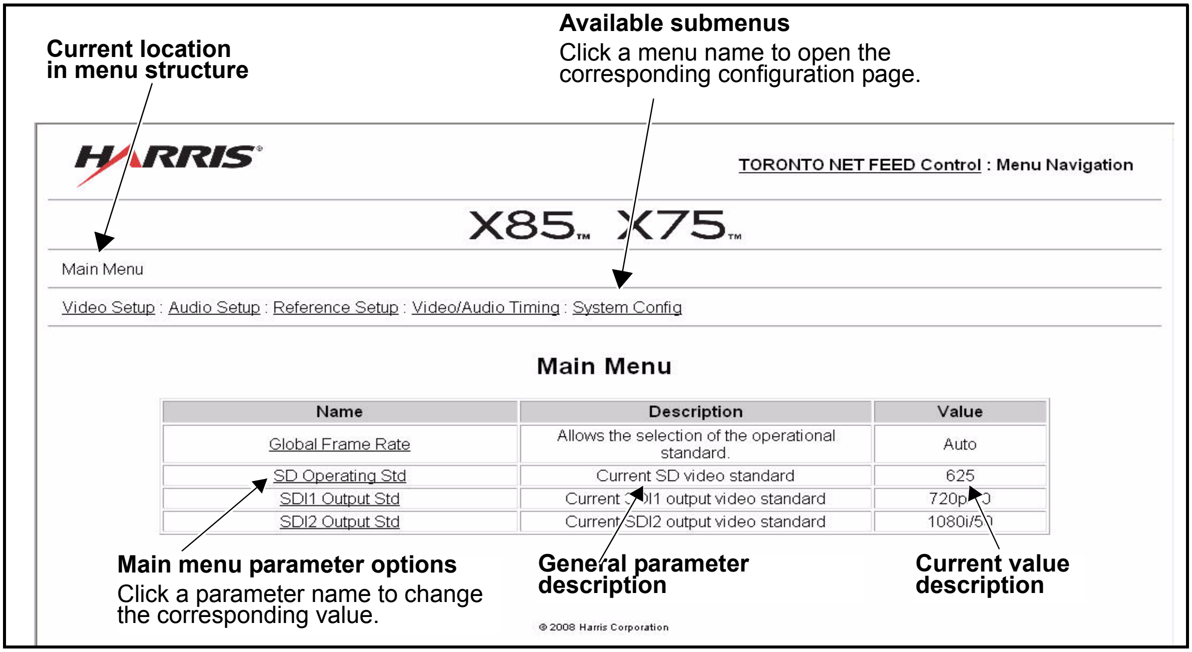


Figure 6-2. Main Menu Page

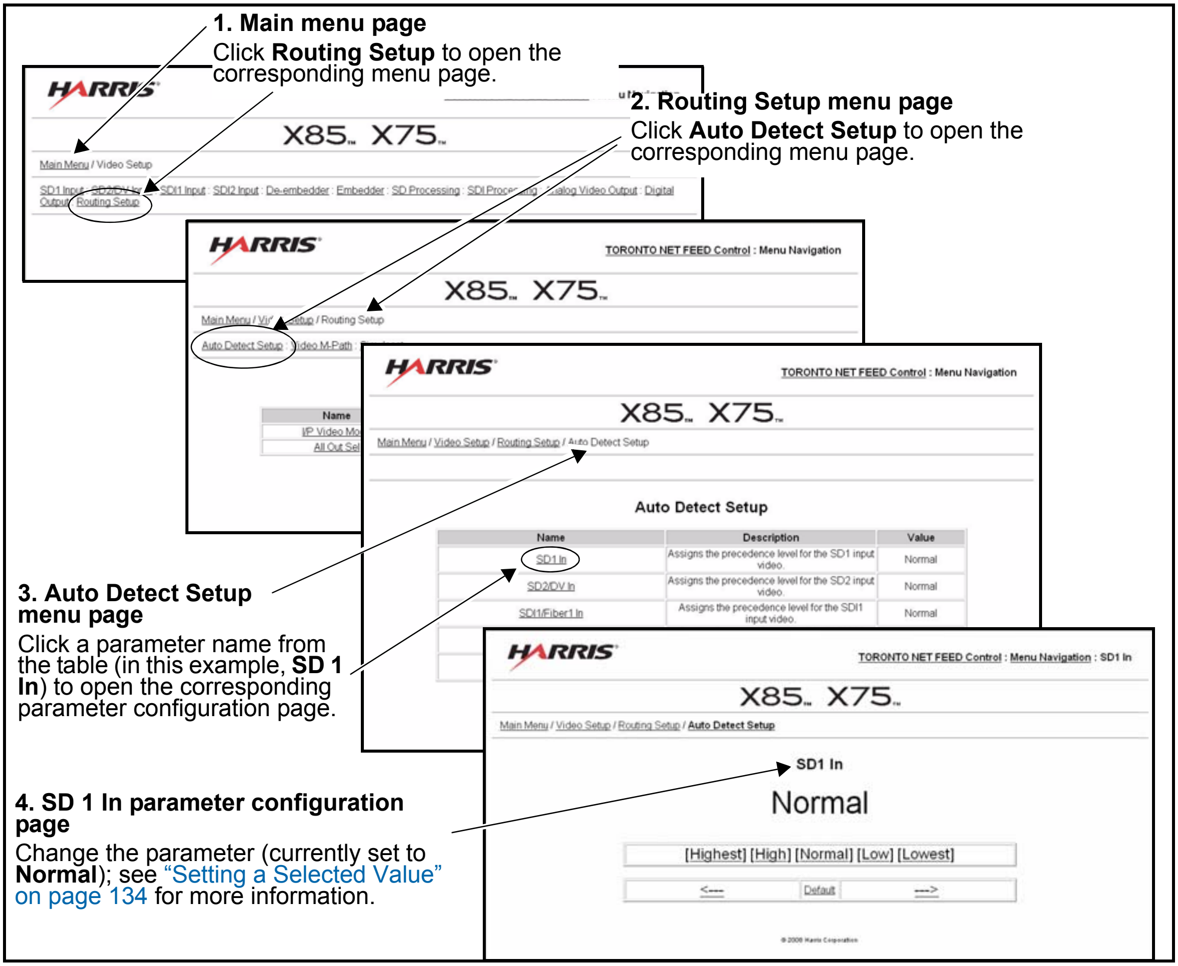


Figure 6-3. Sequence of Pages that Result During Navigation (Example)

Setting a Selected Value

To set a parameter value, navigate through the required menu and submenu structure until you reach the desired option. Click the parameter name from the table to open the corresponding parameter page and to modify its value.

Individual parameter pages show a minimum, maximum, and default value for the selected option. Click a minimum or maximum value, or enter a specific value in the provided text field, to change the parameter setting. Alternatively, you can click the --- > or <--- arrows to increase or decrease the values incrementally, or click **Default** to return the parameter to its factory setting. (See Figure 6-4.)

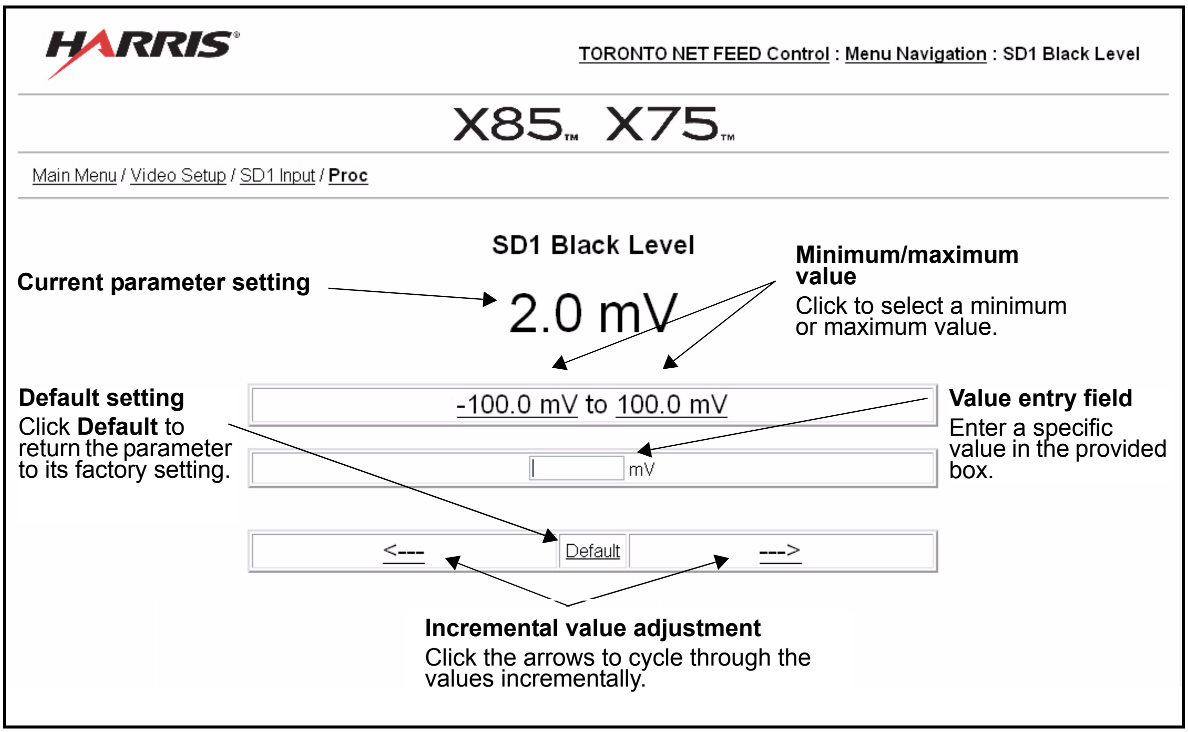


Figure 6-4. Setting a Parameter Value (Range)

For parameter options with discrete values, all of the available values are displayed. Click one of the values to set the option for that value. Alternatively, you can click the --- > or <--- arrows to cycle through the values, or click **Default** to return the parameter to its factory setting. (See Figure 6-5).

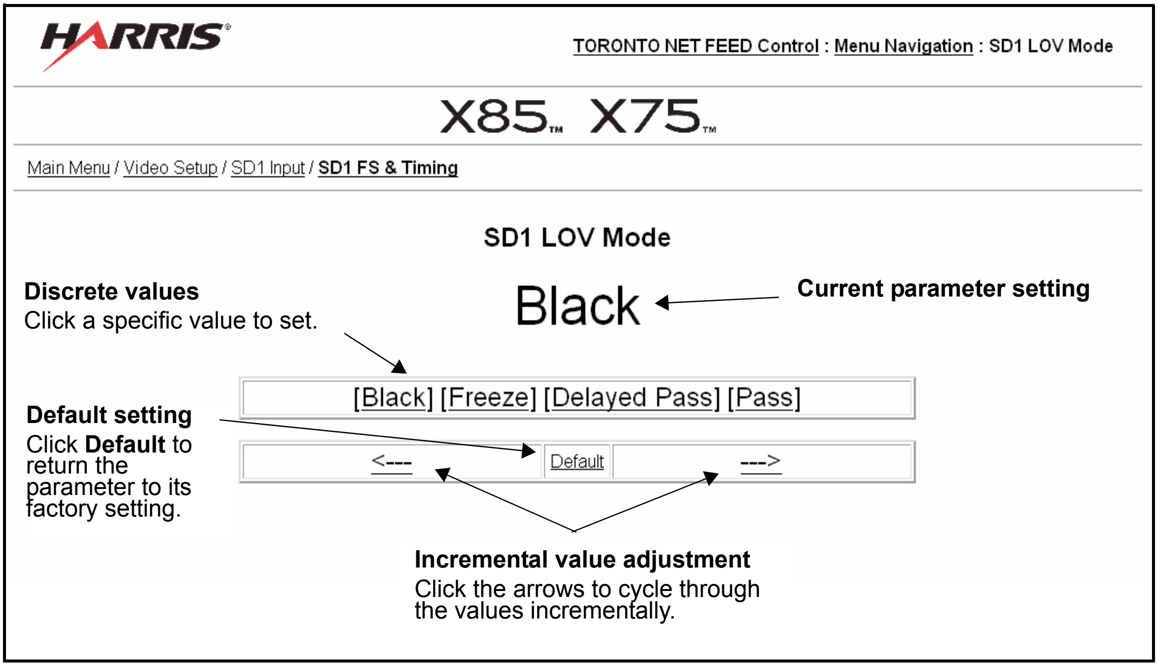


Figure 6-5. Setting a Parameter Value (Discrete)

Some parameters show read-only options that cannot be changed. Others may be disabled and unavailable for configuration. (See Figure 6-6 on page 136.) If you require more information about the read-only function, click **Read Only** to open a Help page. The Help page provides general information about read-only and disabled parameters. See "Getting Help" on page 141 for more information.

To ensure that the values shown on your screen are current, be sure to refresh the screen on your browser regularly.

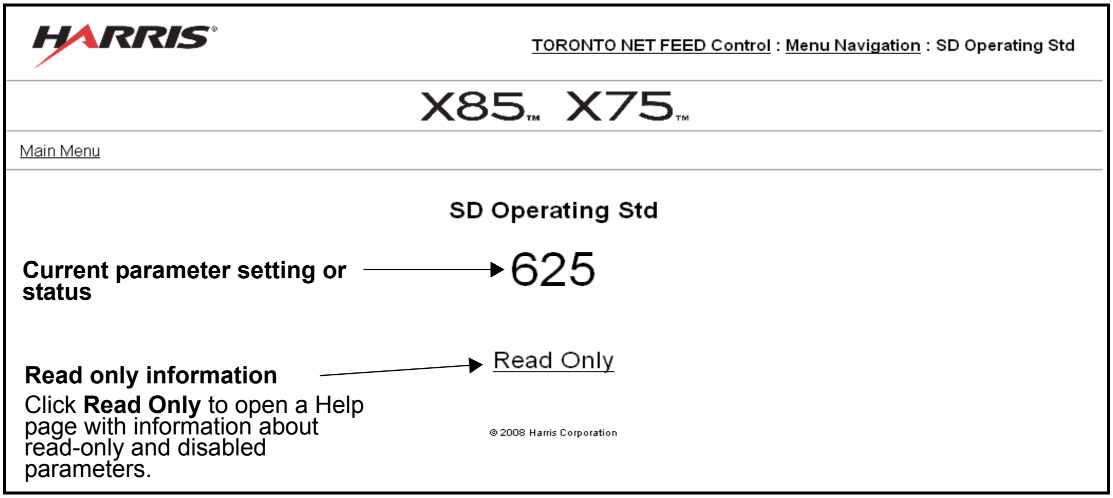


Figure 6-6. Viewing a Read Only Parameter

Navigating Menus and Options via the Menu Navigation Tree

Click **Menu Navigation Tree** from the Home page to present the X85/X75 menu structure for selecting and setting options. These menus mirror the menus that are accessible through the local and remote control panels of the unit.

The menu listings display available menus and submenus. Click any of these to open the corresponding configuration page. Figure 6-7 shows a sample of the **Menu Navigation Tree** page and a resulting configuration page that opens when you click a submenu.

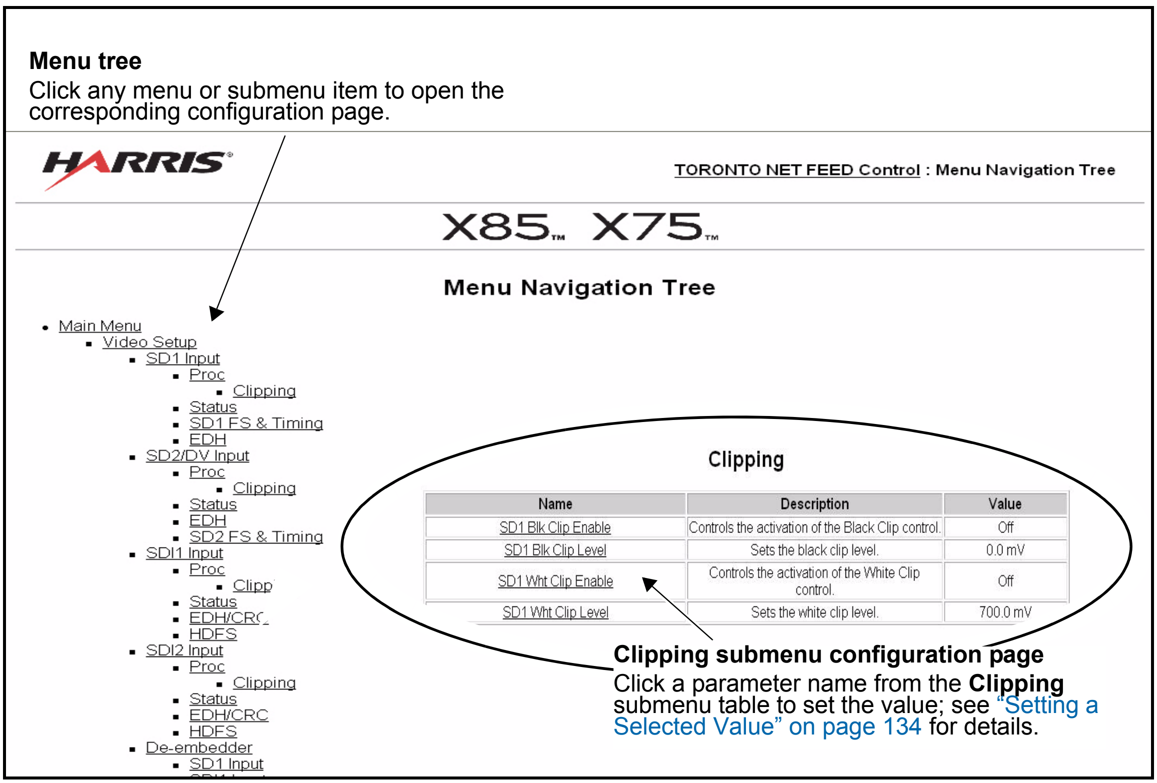


Figure 6-7. Menu Navigation Tree Control Page

Monitoring Alarms

Click **Monitoring** from the Home page to open the **X85/X75 Alarms** page. On this page, you can view or change the status of the active and disabled alarms (see page 139). For a complete list of all of the possible alarms, see the *X85/X75 Parameter List* in html.

Thumbnail Streaming

All X85-3G/X85HD/X75SD units provide a "thumbnail" streaming video output that originates from the **Ctrl/Strm** Ethernet port and is displayed both in the Alarms page of the X75 Web Server and in the Control window of CCS Pilot and Navigator. To activate the streaming in the Web Server, click **Enable Streaming** at the top left corner of the Alarms page (see Figure 6-8).

The frame size of the thumbnail image is 128 x 96 pixels. On the X85/X75 Web server, the default refresh rate is once every 10 seconds, but you can adjust it to a rate of between 5 and 300 seconds. (It can also be turned off entirely.) The control for the refresh rate is located at the bottom of the **Alarms** page.

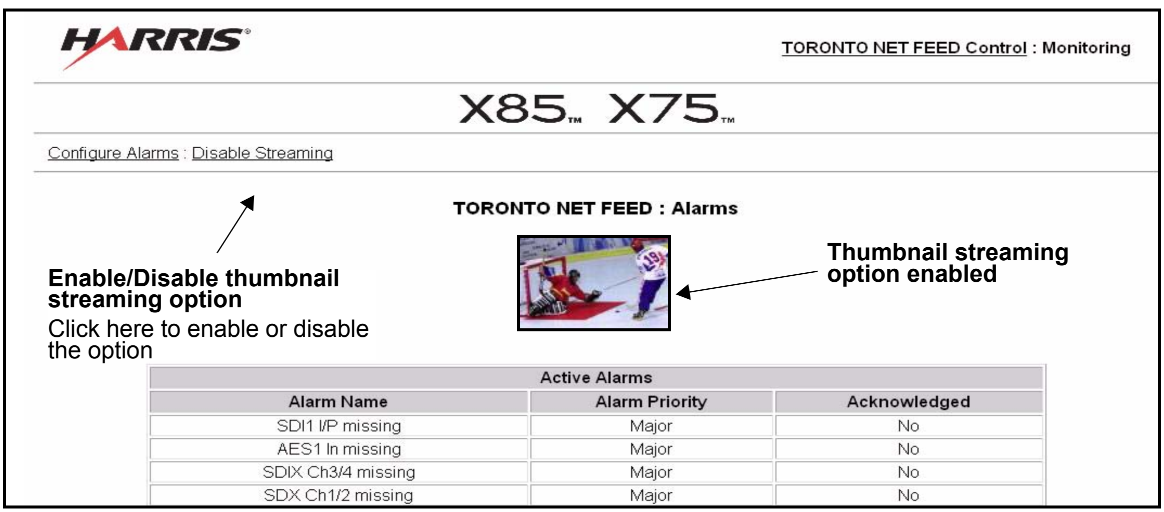
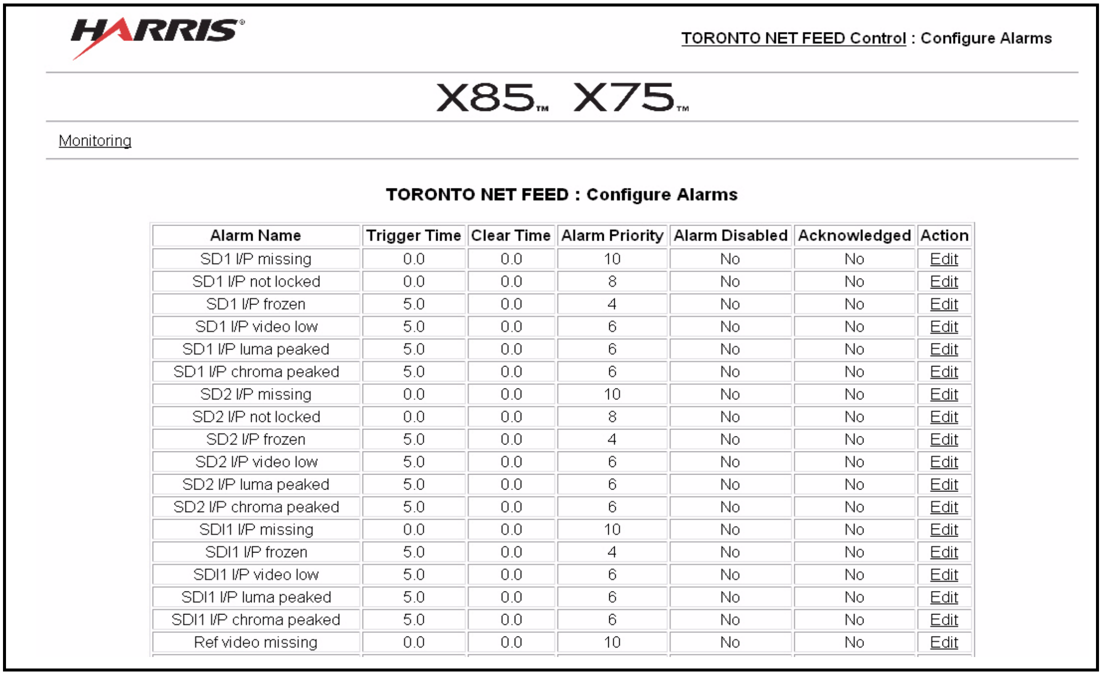


Figure 6-8. *Monitoring Page with Streaming Enabled*

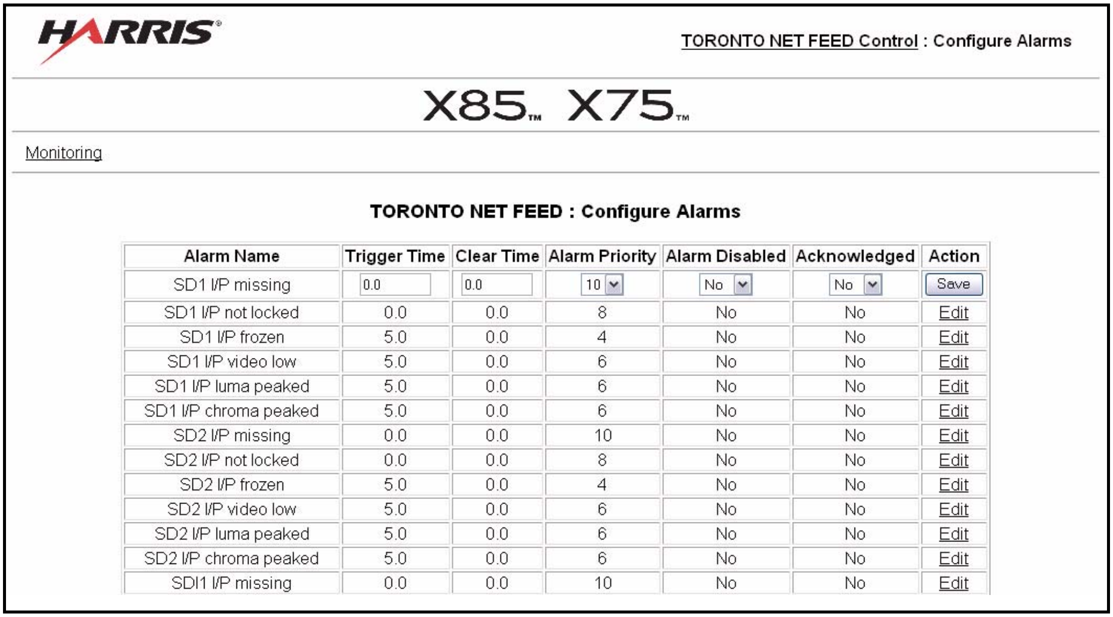
Click **Configure Alarms** from the Monitoring page to open up the alarm configuration page (see Figure 6-9 on page 139). The Configure Alarms page allows enabling of the disabled alarms and also can change each alarm's reporting properties.

Click the **Edit** in the **Action** column to change the selected alarm's properties (see Figure 6-10 on page 140).



Alarm Name	Trigger Time	Clear Time	Alarm Priority	Alarm Disabled	Acknowledged	Action
SD1 I/P missing	0.0	0.0	10	No	No	Edit
SD1 I/P not locked	0.0	0.0	8	No	No	Edit
SD1 I/P frozen	5.0	0.0	4	No	No	Edit
SD1 I/P video low	5.0	0.0	6	No	No	Edit
SD1 I/P luma peaked	5.0	0.0	6	No	No	Edit
SD1 I/P chroma peaked	5.0	0.0	6	No	No	Edit
SD2 I/P missing	0.0	0.0	10	No	No	Edit
SD2 I/P not locked	0.0	0.0	8	No	No	Edit
SD2 I/P frozen	5.0	0.0	4	No	No	Edit
SD2 I/P video low	5.0	0.0	6	No	No	Edit
SD2 I/P luma peaked	5.0	0.0	6	No	No	Edit
SD2 I/P chroma peaked	5.0	0.0	6	No	No	Edit
SDI1 I/P missing	0.0	0.0	10	No	No	Edit
SDI1 I/P frozen	5.0	0.0	4	No	No	Edit
SDI1 I/P video low	5.0	0.0	6	No	No	Edit
SDI1 I/P luma peaked	5.0	0.0	6	No	No	Edit
SDI1 I/P chroma peaked	5.0	0.0	6	No	No	Edit
Ref video missing	0.0	0.0	10	No	No	Edit

Figure 6-9. Configure Alarms Page



Alarm Name	Trigger Time	Clear Time	Alarm Priority	Alarm Disabled	Acknowledged	Action
SD1 I/P missing	0.0	0.0	10	No	No	Save
SD1 I/P not locked	0.0	0.0	8	No	No	Edit
SD1 I/P frozen	5.0	0.0	4	No	No	Edit
SD1 I/P video low	5.0	0.0	6	No	No	Edit
SD1 I/P luma peaked	5.0	0.0	6	No	No	Edit
SD1 I/P chroma peaked	5.0	0.0	6	No	No	Edit
SD2 I/P missing	0.0	0.0	10	No	No	Edit
SD2 I/P not locked	0.0	0.0	8	No	No	Edit
SD2 I/P frozen	5.0	0.0	4	No	No	Edit
SD2 I/P video low	5.0	0.0	6	No	No	Edit
SD2 I/P luma peaked	5.0	0.0	6	No	No	Edit
SD2 I/P chroma peaked	5.0	0.0	6	No	No	Edit
SDI1 I/P missing	0.0	0.0	10	No	No	Edit

Figure 6-10. Editing Alarms Page

Getting Help

For certain parameters, help text is provided to answer why a parameter may be disabled or is available only as a “read-only” item. On parameter setting pages where you cannot change the value, click **Read Only** to open the provided Help page. The Help page provides general information about read-only and disabled parameters. See Figure 6-11.

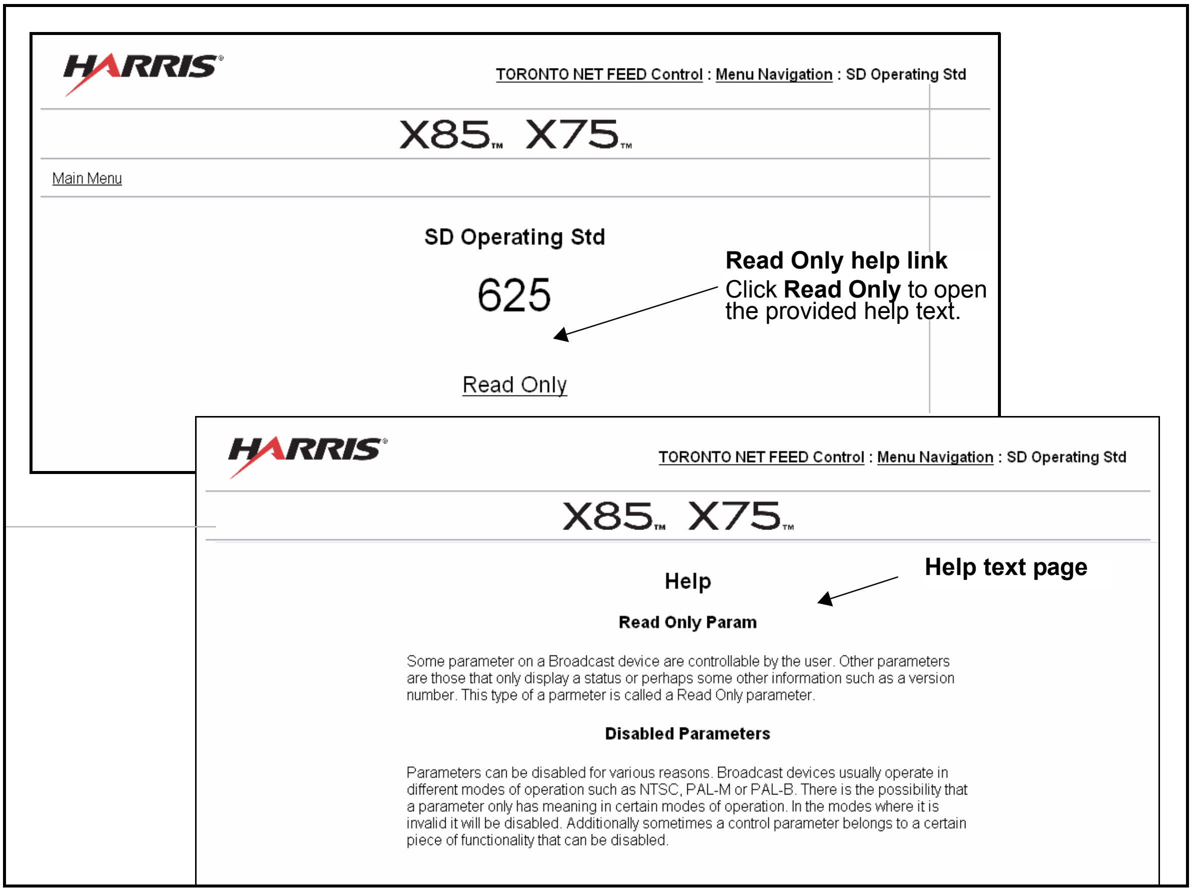


Figure 6-11. Read Only Parameter Sample

Chapter 7

Initial Configuration

Overview

This chapter describes the various configurations and settings that are required before you begin operating the X85/X75. Although you can modify all parameters and settings at any point during operation, there are certain control options and configurations that you need to set first, including those listed below:

- "Initial Power-Up and Control Steps" on page 144
- "Configuring Network Settings" on page 146
- "Changing the PC Network Settings" on page 150
- "Remotely Controlling X85/X75 Systems" on page 153
- "Processing Modes" on page 159
- "Configuring the GPI" on page 164
- "Alarm Options" on page 165

Unless otherwise specified, instructions in this chapter are provided for making changes via a local or remote control panel.

Also see "Video Configuration" in Chapter 8, page 167 and "Audio Configuration" in Chapter 9, page 223

Initial Power-Up and Control Steps

1. If you have an X75OPT-AS-8/16 audio option card, ensure all jumper settings have been made. (The X75OPT-AS-32 module does not require jumper settings.)

   See “X75OPT-AS-32 /X75OPT-AS-16 /X75OPT-AS-8 Audio Modules” on page 16 for details about the jumper settings.

   The X75OPT-AS-8/16 audio module is shipped with the following jumper settings: 100 kΩ for input impedance, and 66Ω for output impedance. If 600Ω impedance is required, all input and output jumpers should be placed on pins 1 and 2.

2. Install the X85/X75 in a rack and make the required system connections (see the instructions beginning on page 81).

3. Plug the unit into a grounded electrical source.

   The unit is factory configured with default settings, including the following network settings:

   - IP address: 192.168.100.250
   - Subnet mask: 255.255.255.0
   - Gateway: 192.168.100.250
   - Machine name: My unit

NOTE

The current system IP address and network settings can be viewed on a local or remote panel VFD screen. If you do not have access to a control panel, and cannot remember the set IP address of your system, see “Forgotten IP address” on page 296 for more information.

Upon request, Harris Broadcast Communications can preconfigure X85/X75 systems with specific IP addresses and network settings. Please contact your customer service representative for more details.

4. Using a frame-mounted local control panel, configure the network settings for each system by assigning a unique IP address to each unit, configuring the subnet mask to be the same for all units on a shared network, and changing the gateway if required (see “Configuring Network Settings” on page 146 for details).
5. If you are controlling the unit remotely via remote control panel, make the required Ethernet connections (see “Remotely Controlling X85/X75 Systems” on page 153 for details).
6. If you are controlling the unit via a third-party Web browser, launch the Web browser (see “Configuring for HTTP Control via Web Browser” on page 156 for details).
7. If you are controlling the unit via a third-party SNMP browser, make the appropriate connections and download/configure the appropriate MIB and SNMP agent files (see “Configuring SNMP Support” on page 398 for details).
8. Configure your video (and audio) input settings prior to operation (see “Configuring the GPI” on page 164 and “Configuring the GPI” on page 164 for details).

Configuring Network Settings

When shipped, the X85/X75 is configured with a default IP address, subnet mask, and default gateway. If you intend to control the unit remotely, or connect it to a network hub/switch along with other X75 or X85 units, you will need to reconfigure the IP with unique network settings. Local control (with a direct Ethernet crossover connection to a PC) does not require any IP configuration.

Supported Network Protocols

The X85/X75 supports the following network protocols for remote/network control:

- CCS Protocol (for example, using an X85-RCP remote control panel).

  See “Remotely Controlling X85/X75 Systems” on page 153 for details.
- HTTP (for example, using a Microsoft Internet Explorer 6.0).

  See “Configuring for HTTP Control via Web Browser” on page 156 for details.
- SNMP (for example, using NuDesign Visual MIBrowser Pro 3.1).

  See “Configuring SNMP Support” on page 398 for details.

Making Required Hardware Connections

If you are connecting an X85/X75 directly to a PC (no network connection), connect one end of a crossover Ethernet cable to the **Ctrl/Strm** RJ-45 port on the back of the frame, and the other end to the PC **Ethernet** port.

If you are establishing a network connection, connect a straight-through 10/100Base-T Ethernet cable between the X85/X75 **Ctrl/Strm** port and the network hub/switch.

Setting IP and Subnet Mask Addresses

To allow devices to communicate on a network, you need to set all X85 and X75 devices to the same subnet (network location). When shipped, X85/X75 units are configured with the same default IP (device identifier) and subnet addresses. These addresses need to be changed so that each unit is uniquely identified and the network location of all units is accurately reflected.

An IP address is made up of a four-item set of numbers (octet). The default (factory-configured) IP address for every X85/X75 unit is **192.168.100.250**. For a class C network, you must change the first three items in the octet to identify the location (address) of the unit on your network, and also change the last item in the octet to uniquely identify the device from other X85/X75 units.

The default subnet mask address for every X85/X75 is **255.255.255.0**.

Setting the IP Address of a Single Unit with LCP or RCP

Follow these steps to configure the network addresses using a local or remote control panel:

1. Apply power to the RCP or an X85/X75 with a local control panel.

   When ready for configuration, the X85/X75 main menu shows on the display screen.
2. Follow this path: **System Config** > **Setup** (in the RCP, select **Device Setup**).
3. Scroll to the **Device IP** parameter, and then press **Enter**.

   If this is a new unit being configured, the default IP displays. Otherwise, the current IP address of the unit displays.
4. Change the IP address by following these steps:
   a. Press **Enter** to navigate to one of the four number sets in the octet.
   b. Modify the address value by using the scroll knob to set a new number.
   c. Press **Enter** to move to the next item in the octet, and then repeat step (b) above.
   d. Press **Exit** when you are finished configuring the address.

5. Scroll to the **Subnet Mask** parameter, and then press **Enter.**

   If this is a new unit being configured, the default subnet mask displays. Otherwise, the current subnet displays.

6. Repeat the procedure described in step 4, this time for the subnet mask.
7. Scroll to the **Gateway** parameter, and then press **Enter**.

   If this is a new unit being configured, the default gateway displays. Otherwise, the current gateway address displays.

8. Repeat the procedure described in step 4, this time for the gateway parameter.
9. Select **Save IP**, and then press **Enter**.
10. Select **Yes** option and then press **Enter**.
11. Press **Exit** to return to the **Setup** menu.
12. Select **Soft Reboot**, and then select **Yes**.

    To restart an X85/X75 unit with a blank front panel, unplug it and then reapply power.

Setting the IP Addresses of Multiple Units

If you have multiple X85/X75 systems that require network configuration, you will need to set unique IP addresses and assign a subnet mask and gateway address for each of them one at a time. The following procedure summarizes the required steps:

1. Apply power to the first X85 or X75 unit with a frame-mounted local control panel.

   When ready for configuration, the main X85/X75 menu shows on the display screen.

2. Configure the network settings for this unit, as described in the procedure on page 147.
3. Restart the X85/X75 unit.
4. Plug in the next X85/X75 system, configure its network information, and then restart the unit.

   Follow this procedure for all remaining X85 or X75 units that require configuration.

5. If you will be using a remote panel, configure the RCP's network settings in the same way as you would for an X85 or X75 system (see page 153).

6. Connect all X85/X75 systems and remote panels to a network hub or switch using a 10/100Base-T Ethernet cable.
7. Ensure that all configured X85/X75 units are detected on the network.

   To do this, press **Remote** on the front panel of either an RCP or a frame-mounted local control panel (see “Selecting a Remote Unit to Control” on page 154). All X85/X75 units configured with the same subnet mask address will display (you will see a list of all detected IP addresses).

   If a unit or RCP is not detected, ensure that the subnet mask address is accurate. Alternatively, confirm that all units were restarted after configuring any network settings.

NOTE

If configured to be on the same network, the following items will be detected: X85/X75 systems, X85/X75-RCP panels, and any DPS-575 systems.

Changing the PC Network Settings

In unusual situations, such as correcting a failed software upgrade, you may need to change your PC network settings.

NOTE

You will probably require administrator privileges on your PC to change the IP Address

Follow these steps to change the settings:

1. Change the IP Address of the PC to match that of the X85/X75, by following theses steps:
    a. Click **Start > Settings** and then click **Control Panel**.

       This opens the Control Panel window.
    b. Double-click **Network and Dial-up Connections,** and then double-click **Local Area Connection.**
    c. Click the **General** tab, and then click **Properties**.

       This opens a new **Local Area Connection Properties** window.
    d. On the **General** tab, select **Internet Protocol (TCP/IP)**, and then click **Properties**..., ensuring you are working on the correct Ethernet adapter for the CCS network.

       The IP Address of the **Internet Protocol TCP/IP Properties** box appears.

       Figure 7-1 shows the portion of the Internet Protocol TCP/IP Properties box where you enter the IP Address, Subnet Mask, and Default Gateway of your PC.

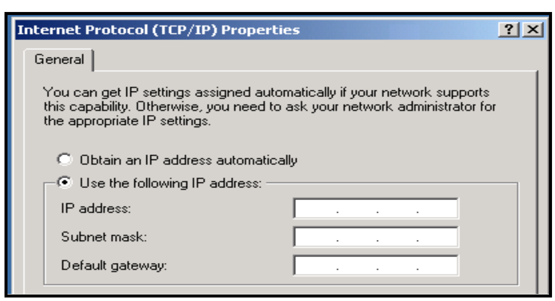


Figure 7-1. Portion of IP Address Box

e. Note whether **Obtain an IP address automatically** is selected.

   You may need to re-select this option later when you revert back to the original PC IP Address.

f. Select **Use the following IP address**, and in the **IP address** box, type a new computer IP Address to match the first three octets of the IP Address of the X85/X75, and then add a different fourth octet.

   (For example, if the X85/X75 IP Address is 192.168.100.50, you could type 192.168.100.181).

g. In the **Subnet Mask** field, type: `255.255.255.0`

   This value applies to Class C IP addresses; confirm the number with your network administrator.

h. Enter the same **Default Gateway** number as the one on the X85/X75, or leave blank.

i. Click **OK** to close the **TCP/IP Properties** box, and then close the two **Local Area Connection** boxes.

2. Verify the network settings were accepted by following the ipconfig procedure, as described below:

   a. Click **Start**, point to **Programs** > **Accessories** and then click **Command Prompt** to open the **Command Prompt** window on the PC.

   b. Type the following at the MS-DOS command prompt, and then press ENTER:

      `ipconfig`

      The IP Address, Subnet Mask, and Default Gateway of the PC appear. (In some situations, the Default Gateway value is not shown. See Figure 7-2 on page 152.)

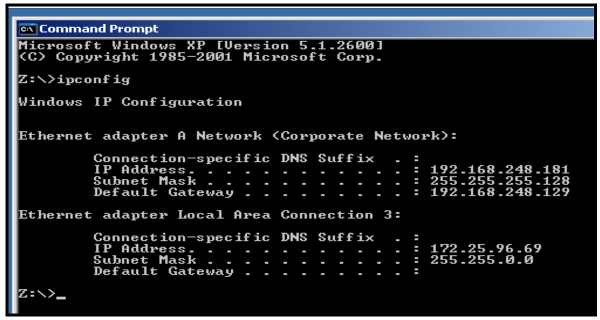


Figure 7-2. IP Address, Subnet Mask and Default Gateway of PC

c. Write down the IP Address, Subnet Mask, and Default Gateway numbers of your PC.

d. Compare the network numbers of the X85/X75, with the numbers found in step 2c.

   In general, the two Subnet Mask and Default Gateway numbers should be identical. The first three octets of the two IP Addresses also are generally identical. For example, if the X85/X75 has an IP Address of 192.168.248.50, the PC could have an IP Address of 192.168.248.181.

3. If the network settings match, click **Close**.

NOTE

Where more than one network is involved and the Point-to-Point option has been selected (see CCS PIlot/Navigator online help), the network address values may be entirely different.

Remotely Controlling X85/X75 Systems

This section provides the following general configuration procedures:

- "Preparing for Remote Control via Control Panel" (below)
- "Selecting a Remote Unit to Control" on page 154

Information about remote access to presets appears on page 126.

Preparing for Remote Control via Control Panel

Control panels remotely control X85/X75 units via broadcast. Switchers and routers in the network need to be configured accordingly.

NOTE

A frame-mounted local control panel can also remotely control other networked X85/X75 units. Procedures described in this section also apply to local panel control. See "Using a Frame-Mounted Local Control Panel for Remote Operation" on page 155 for more information.

Follow these steps to prepare your X85/X75 models for remote control:

1. Using an LCP, reconfigure each X85/X75 and X75-RCP unit with unique IP addresses and other appropriate network settings, including shared subnet mask addresses.

   See "Setting IP and Subnet Mask Addresses" on page 147 for details.

2. Restart each X85/X75 and X75-RCP unit, and then wait 20 seconds to allow for network detection.

3. Connect all X85/X75 systems and remote panels to a TCP/IP-based network hub or switch using 10/100Base-T Ethernet cable.

   On X75-RCP units, use the **Control** Ethernet connector; on X85/X75 units with frame-mounted local control panels, use the **Ctrl/Strm** port at the back of the X85/X75 unit.

4. Discover all units found on the network, and then select the one you wish to control. See "Selecting a Remote Unit to Control" on page 154 below for details.

Selecting a Remote Unit to Control

You can remotely control all X85/X75 systems that share the same subnet, using an X75-RCP panel or a frame-mounted local control panel. Both examples of remote control are described in the sections that follow.

NOTE

If the network settings are not configured properly (either on the RCP or individual X85/X75 units), the units may not be detected. Confirm all network settings, if required.

Using an X75-RCP for Remote Operation

Follow these steps to select and control a detected X85/X75 over the network:

1. Ensure all connections and network settings have been made.
2. On the X75-RCP, press the **Remote** button to bring up a list of available units for control (see Figure 7-3).



Figure 7-3. List of Systems Available for Remote Control

The **<local device** > option shown on-screen represents the unit you are using (the local unit that is in front of you), and is always available on this list. An asterisk (*) beside the name indicates that this is the remote system currently being controlled by the panel.

NOTE

Instead of IP addresses, you can give alphabetical names to individual X85/X75 units that will appear in the list. To create an alphabetical name for an X75 or X85 unit (for example, Studio_B), follow: **System Config > Setup > Machine Name**. Use the scroll knob and the Enter button to create the name. When you have reached the end of the name, press **Enter**.

3. Use the control knob to scroll through the list of available X85/X75 devices, highlight the unit you wish to control, and then press **Enter**.

   The X75-RCP screen reads **Connecting...**

4. Wait a few moments.

   The menu of the selected X85/X75 unit appears along with all of that unit's settings.

5. Operate the selected unit as required.

   Once a unit is selected for remote control, all front panel features operate as if you were actually at the front panel of the selected remote unit. This means that the VFD panel, status indicators, and buttons (with the exception of the **Remote** and **Option** button) all control and/or reflect the status of the remote unit, *not* the one you are physically operating.

NOTE

The light on the **Remote** button flashes while the unit is remotely controlling a device.

6. To switch to another unit, or to control the local device you are physically operating, press the **Remote button**, and then select a new device to control.

7. Select **<local device >** to resume normal single-unit operation.

Accessing Presets and Favorites

You can reach Presets and Favorites from a remote panel by enabling the Force DPS Protocol feature. Press the **Options** button and select **Setup > Force DPS Protocol > Yes.**

Using a Frame-Mounted Local Control Panel for Remote Operation

After ensuring that all connections and network settings have been made, you can also remotely control X85/X75 units that are on the network using a frame-mounted local control panel. To do this, click **Remote** on the LCP to enter Remote mode, and to view the list of X85/X75 units available for control on the same subnet. The procedure remains the same for selecting and operating devices remotely via the LCP, as it does for the X75-RCP.

Configuring for HTTP Control via Web Browser

Once the networking parameters of the X85/X75 have been configured appropriately, and it is connected to the Ethernet network, the built-in Web server allows a standard Web browser to control the frame. Before controlling your frame in this way, note the following system and browser requirements:

- The X85/X75 supports Web browsers that are compatible with HTML 4.0 (and later).
- Although most standard Web browsers can be used with the X85/X75 for HTTP control, the following browsers have been tested and approved: Microsoft® Internet Explorer 6.0, Netscape® Navigator™ 7.2, and Mozilla® Firefox™ 1.0.

NOTE

Web browser control is only available for X85-3G/X85HD/X75SD units, and not for X75-RCP panels.

To select a unit for control, follow these steps:

1. Ensure all required connections and network settings have been made locally on your X85/X75 unit(s).
2. Open a supported Web browser, and then type the IP address of the unit you wish to control into the **Address**, **Location**, or **URL** field of your Web browser (the name of the field depends on the Web browser you are using). For example, type the following to control an X85/X75 unit with this IP address:

   ```
   http://192.168.100.250
   ```

   The Web browser then displays the Home page of the X85/X75 Control interface (Web server).

See "Operation by Web Server Software" on page 129 for more information.

Configuring for CCS Software Control

The Windows-based CCS software applications, such as Pilot and Navigator, provide control of the X85-3G/X85HD/X75SD via a Windows-based PC and enables you to accomplish these tasks:

- Discover remote CCS devices dynamically on your CCS network without knowing their IP addresses
- Build custom hierarchical views of the distributed network for each network user, using icons, colored text, and other visual information
- Design, model, and test your CCS system
- Set up user accounts and groups with different access rights to CCS devices and their control parameters
- Centrally navigate, control, and monitor CCS devices over a local- or wide-area network
- Set alarms to signal visual, auditory, or e-mail alerts when CCS devices go off-line or malfunction
- Transfer software upgrades to CCS devices
- Diagnose and correct problems with the CCS network or devices
- Monitor the integrity of video signals throughout a facility

Configuring for SNMP and Third-Party Software Control

SNMP is an industry-standard protocol that allows other manufacturers' control software to remotely monitor and control X85-3G/X85HD/X75SD units. Harris provides a MIB file that you can download from the website for this purpose. The file defines the parameters of the X85/X75, and is required for third-party software control.

See "Configuring SNMP Support" on page 398 for details.

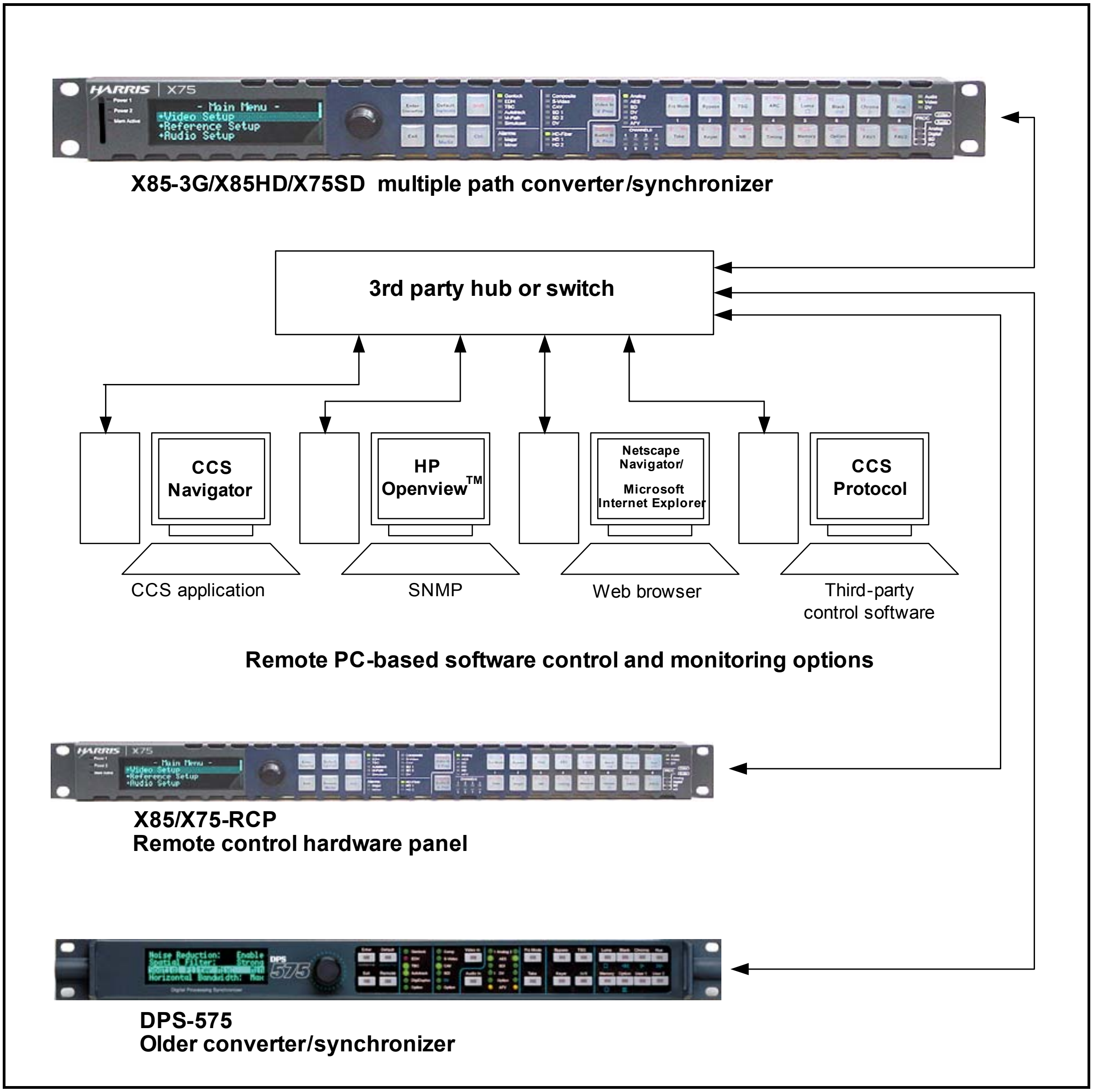


Figure 7-4. Network Configuration Diagram

Processing Modes

General Information

Video **M-Path** (**Custom**) configuration (**Video Setup > Routing Setup > I/P Video Mode)** is performed on the following groups of video outputs:

- Analog (includes five analog output types: composite, CAV (Y, B-Y, R-Y), S-video, RGB, Aux-composite)
- HD (as HD 1, HD 2, and HD-Fiber in the X75, and SDI 1, SDI 2, Fiber 1 and Fiber 2 in the X85)
- SD 1 and SD 2
- StrV (streaming video

These output groupings are used for configuration purposes. You can individually set each of these output groups to accept a specific input source. In addition, there are four special routable blocks in the SDTV video configuration path that may be included in the input path for any input signal.

Alternatively, you can use the **AllOutSelect** parameter to select an input source for all output groups simultaneously (press the **Video In** button to access). Table 7-1 on page 160 summarizes the video output groups and available input sources.

NOTE

If you are missing certain option modules, the corresponding outputs will not be available.

Table 7-1. Video Output Groups and Available Video Input Sources

Output Groups	Physical Outputs Forming Part of this Output Group	Input Source to Assign to Each Output Group
• Analog • HD • SD 1 • SD 2 • StrV	• Composite, CAV, S-Video, Aux, RGB • HD 1, HD 2, HD Fiber, DVI (X75) / SDI 1, SDI 2, Fiber 1 and Fiber 2 (X85) • SDI 1 • SDI 2 • Streaming	• Composite • S-Video • CAV • SD 1 • SD 2 • HD Fiber (X75) / Fiber 1 (X85) • Fiber 2 (X85) • HD 1 (X75) / SDI 1 (X85) • HD 2 (X75) / SDI 2 (X85)

Input Video Modes

The X75 has three input video modes; the X85 includes those three and adds three additional modes (see page 42). For manual configuration, use **M-Path (Custom)**. In this mode (found at **Video Setup > Routing Setup > I/P Video Mode**) you can assign input sources to each output group. However, if you set the **Input Video Mode** to **Auto Detect** (default), the X85/X75 will automatically detect the incoming input signal(s) and then send it to all output groups.

NOTE

If you make manual changes to the input/output paths, the input video mode will revert from **Auto-Detect** to **M-Path (Custom)** mode.

In the default **Auto Detect** mode, the X85/X75 senses the presence of valid input signals, and then processes them to all outputs. This mode is a useful redundancy feature: If one input signal disappears, the X85/X75 will automatically switch to **AllOutSelect** control, and will process whatever input is detected and send it to all outputs. If the X85/X75 detects more than one valid input, it will refer to the precedence order set by you in the **Auto Detect Setup** section (**Video Setup** > **Routing Setup**), or it will apply the default priority order.

A third input video mode is **Simulcast**. In this mode you can assign two different input sources to selected output groups for the purpose of switching between the sources. In most instances, you would use a GPI control to switch between the selected input sources at the required time. When you change an input source, the **AllOutSelect** control also changes the output mappings accordingly.

NOTE

Precedence levels that can be assigned include **Highest**, **High**, **Normal**, **Low**, and **Lowest**. (For example, if the X75 unit detects two input signals, it will accept an HD signal tagged **Highest** over an SD-SDI signal that is tagged **Normal**.) See “Selecting a Video Source” on page 168 for more information.

Configuration Exceptions and Further Information

There are a few exceptions to the input source/output group mapping process described in the previous sections, including the following:

- "Mutually Exclusive Inputs"
- "AllOutSelect Limitations"
- "SD-ARC Limitation"
- "Strobe or Film Mode and Closed Captioning"

Mutually Exclusive Inputs

Within each of the following groups, you can select only one input at a time:

- SDI 1/Fiber 1 (X85)
- HD1/HD-Fiber (X75)
- SDI 2/Fiber 2 (X85)
- Composite/CAV/S-video (A3D, PQM)

These groupings are not independent inputs. Only one input type in each of these groups can be selected for each output group.

AllOutSelect Limitations

The **AllOutSelect** control lists all available input sources. But in cases where you have manually assigned different input sources to various output groups, **AllOutSelect** is not able to reflect a single input type. Instead, **M-Path** control becomes selected.

As soon as you manually configure any of the **M-Path** menu output groups, **AllOutSelect** control will change over to the **M-Path** control.

Note that if you change **AllOutSelect** to a single input type, and you return to **AllOutSelect** control, all manual changes done previously during **M-Path** configuration will be overridden.

SD-ARC Limitation

When SD-ARC selects one of the standard definition inputs, it uses the data path from the main board to the HD board for SD aspect ratio conversion. The same data path is also used for the up-conversion. Due to this limitation, when the HD output selects any one of the standard definition inputs, the software also changes the SD-ARC source selection.

Strobe or Film Mode and Closed Captioning

The Strobe or Film mode (**Video Setup > SD Processing > Strobe Delay**) does not support the passing of the closed captioning data to the outputs, as this process does not guarantee the continuation of the metadata.

Configuring the GPI

The GPI inputs are internally pulled HIGH. External contact closure to ground will trigger the assigned function set by the user.

In the **System Config > Setup** menu, the two **GPI-1 Function** and **GPI-2 Function** parameters allow the selection of pre-defined or user assigned GPI functions:

- Disabled—No action will be taken
- Freeze—Will freeze all the internal frame synchronizers memory
- SD Logo Enable
- HD Logo Enable
- Simulcast A/B—Switches between simulcast video source A and video source B
- Voice-Over—Ramps down the program audio channels and mixes the voice-over channel to the program audio outputs.
- Fav1— Activates the GPI set parameter in the Favorite list 1.
- Fav2—Activates the GPI set parameter in the Favorite list 2.
- Recall Preset 1 (applies to GPI 1)
- Recall Preset 2 (applies to GPI 2)

For instructions on how to add a parameter and assign it as a GPI input in a Favorites list, see “Using the FAV1 and FAV2 Function” on page 226.

Also see “GPI In Presets” on page 125.

Alarm Options

Alarms on X85 and X75 units are divided into Major and Minor categories, and this list shows the default category. You can change the priority of the individual alarms by assigning them a number between 1 and 10. Minor alarms are those between 1 and 5; Major alarms are between 6 and 10.To see the alarms list, press the **Options** button and then select **Configure Alarms**.

For a complete list of the X85 and X75 alarms, see the *X85 and X75 Parameter List* html file.

Table 7-2. Configure Alarms Menu

Menu Item	Description
Trigger Time	A filter that sets the duration (in seconds) between the time an alarm is detected, and the time an alarm is reported to the Web Server, CCS application, or Alarms LED
Clear Time	A filter that sets the length of time the alarm continues to be reported after the alarm condition is no longer detected (default values are set at 0 seconds)
Priority	The numerical value given to the priority of the alarm (1 = low priority and 10 = high priority; any alarm above 5 is designated Major)
Alarm Disabled	An option that silences the alarm, even though the alarm condition may continue to exist (If the alarm is re-enabled and the condition is not corrected, the alarm is reactivated immediately.)
Alarm Mute	An option that suppresses alarm messages when the state of the alarm changes (The control panel is affected when the mute is enabled. However, the Web Server application will display the alarm message in its next polling cycle, or when you refresh the screen. The Alarm Mute is not displayed in CCS applications.)
Acknowledged	A “flag” that indicates someone is attempting to correct the source of the alarm (In X85 and X75 control panels, an asterisk appears beside the alarm in the Active Alarms List.)

Chapter 8

Video Configuration

Overview

This chapter briefly describes the major video configuration options that can be changed in the course of normal operation.

The following topics are found in this chapter:

See the *X85/X75 Parameter List* HTML document (available for download from our website or from the included *System and Control Panel Documentation CD-ROM*) for lists of all available menus and parameter options.

Selecting a Video Source

General Information

With control panel video shortcuts, you can select an input (or multiple inputs) and immediately send it to all video outputs by pressing the **Video In** button. The LEDs on the left side of this button indicate which input is currently selected. The M-Path (multiple inputs) selection allows any output group to be assigned with the video input sources. When two or more video sources are selected and mapped to multiple output groups, the M-Path and corresponding video input source LEDs will be lit. When the selected input signal is absent, the LED flashes. Table 8-1 lists the available sources:

Table 8-1. X85 and X75 Video Sources

X85	X75
M-Path	M-Path
Composite	Composite
S-Video	S-Video
CAV	CAV
SD 1	SD 1
SD 2	SD 2
Fiber 1	HD-Fiber
Fiber 2	HD1
SDI 1	HD2
SDI 2	

If the **Auto Detect** feature is enabled when a selected input option is not installed or detected, the panel accepts the next available input. If the selected video signal is absent, the corresponding video input LED flashes.

NOTE

If you have not installed the appropriate modules, the corresponding sources are not visible in the **Video In** list.

Procedure

X85 and X75 units are shipped with **Auto Detect** video mode as the factory default setting. This mode sets the X85/X75 to automatically detect the inputs in Table 8-2.

Table 8-2. Auto Detect Inputs

X85	X75
Composite/S-Video/CAV	Composite/S-Video/CAV
SD 1 input	SD 1 input
SD 2 input	SD 2 input
Fiber 1	HD 1/HD-Fiber input
Fiber 2	HD 2 input
SDI 1	
SDI 2	

When video is connected to any of these inputs, the X85/X75 automatically selects the applied input video and then sends out the converted video to all outputs. The **Video Input** LEDs on the front panel show the selected video source.

For analog video sources, only a single video source can be automatically detected. Therefore, you must pre-select the desired analog input video source first in order for auto-detection to work across the HD/SD/analog inputs.

Similarly, you must select HD input sources and SD-SDI 2 inputs first, for the auto-detection to function (for the X75: HD-SDI 1, HD-SDI 2, and HD-SDI Fiber; for the X85: Fiber 1, Fiber 2, SDI 1, and SDI 2).

To change the input signal type, follow these steps:

1. Press **Video In** on the control panel, (or navigate to the **Video Setup > Routing Setup** menu and then select **AllOutSelect**).

   All available inputs will display on the control panel screen.

2. Use the control panel knob to scroll through the list of input types, and then press to **Enter** to select one.

NOTE

If you press the **Video In** button and then manually select a video source, the X85/X75 unit reverts to **M-Path (Custom)**. Video modes are found under **Video Setup > Routing Setup > I/P Video Mode**.

When multiple video sources are connected, the **Auto Detect Setup** setting determines the selection of the input video. For example, if the X85/X75 unit detects two input signals, it will accept the signal tagged as **Higher** over another signal that has been given a lower-precedence. Found in the top-level **Video Setup** > **Routing Setup** menu, precedence levels include **Highest**, **High**, **Normal**, **Low**, or **Lowest**.

When multiple input types are present and assigned the same precedence level, the X85/X75 uses the default ordering shown in Table 8-2 on page 169.

Using the **Video Switch Delay** parameter in the **Video Setup** > **Routing Setup** > **Auto Detect Setup** menu, you can enter the delay value in seconds to prevent inadvertent switching of the input video sources.

Figure 8-1 graphically illustrates a single-source signal process, where one selected video input is fed to all outputs.

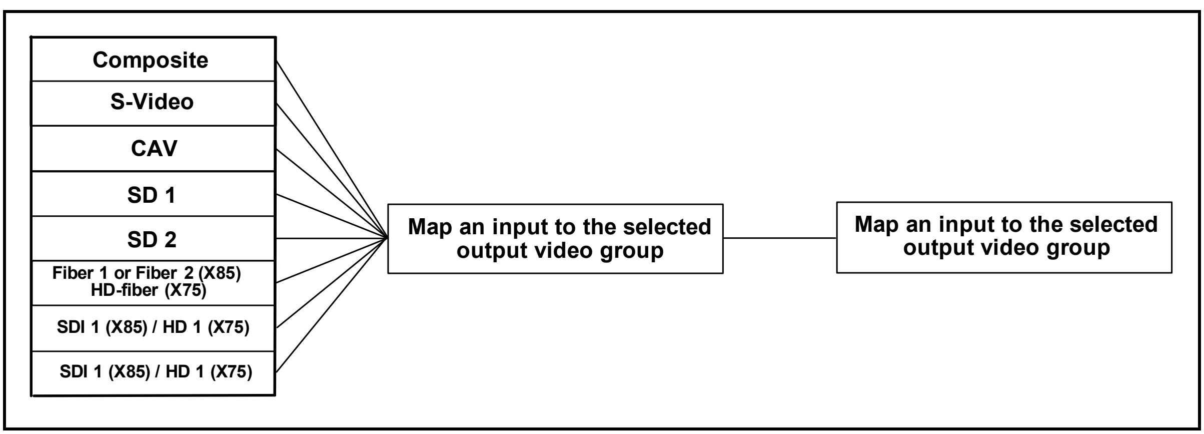


Figure 8-1. Single-Source Processing

Forcing Video Standards

On the X85, if you feed 1080p/25 into an **SDI *x* In** and force the video standard on that input to 1080p/50, you will *not* produce a Loss Of Video (LOV) condition. Instead, the frame synchronizer block will output normal video. The same happens when feeding 1080p/29.97 and forcing the video standard on that input to 1080p/59.94. This is normal behavior.

Adjusting Video Levels

Various control panel buttons provide quick access to the video processing parameters of a selected video source. Simply press a button and use the control knob to change the selection.

For more details, see “VideoProc Amp” on page 216.

Video/Audio Timing Tool

The X75OPT-V2A video/audio timing tool is a software upgrade that makes it possible to correct lip sync problems that occur during conversions. (The video/audio timing tool consists of a receiver and transmitter; the transmitter is free; the receiver is an optional upgrade requiring a software key.) The V2A feature enables a receiving X85/X75 to analyze video and audio test signals and then detect any time propagation differences that may occur during the following processes:

- Up-, cross-, and down conversion
- Analog to digital conversion
- Digital to analog conversion
- MPEG coding and decoding

V2A can operate manually or automatically. The automatic mode aligns received video and audio signals that are up to 1.3 seconds apart.

The **Video/Audio Timing** parameter (found in the main menu) directs you to the timing tool’s parameters. These parameters perform the following functions:

- Display the time by which each audio channel is leading or lagging the video (either SD1, SD2, HD, and/or analog)
- Enable you to load the currently measured video delays to the audio delay parameters, effectively performing audio/video synchronization

NOTE

CCS versions 3.1.2 and earlier do not reliably distinguish between disabled audio parameters and read-only audio parameters.

The X75OPT-V2A video/audio timing tool will only insert audio delays, and thus will not account for situations in which the measured audio processing paths (shown in the middle box of Figure 8-2 on page 173) are longer than the video processing paths—even though the tool will be able to display it. If audio is lagging behind the video, the V2A feature can measure the difference, but you must add the video delay; it cannot be automatically corrected.

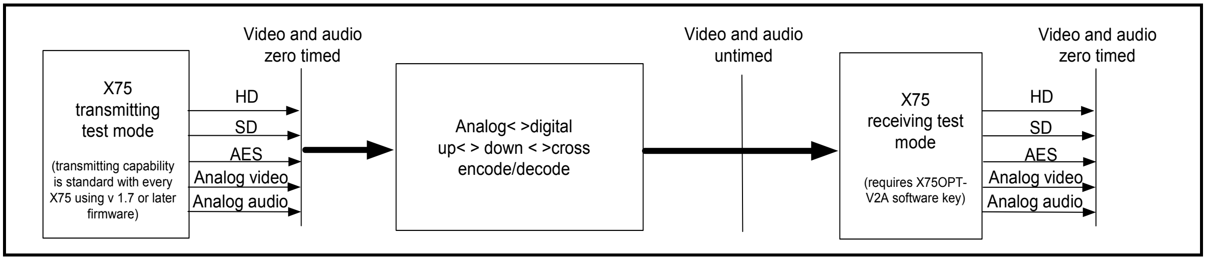


Figure 8-2. X75OPT-V2A Video/Audio Timing Feature

Transmitter

All X85 firmware versions, and X75 firmware versions 1.7 or later are capable of transmitting a special V2A video/audio test pattern. This pattern may be used directly to measure a system's relative video/audio timing delays, or you can record the pattern for later use. To manually configure an X85/X75 unit to output this test pattern, follow these steps:

1. If an X85/X75HD sub-module is present, perform the following steps to enable the HD TSG:

    i. In the X75, navigate to the **Video Setup > Processing > HD TSG & Slide** menu.

       In the X85, navigate to the **Video Setup > SDI *x* Processing > SDI *x* > TSG** menus

    ii. In the X75, select **HD-TSG Select > Color Bars 100%**.

       In the X85, select **TSG Select** > **Color Bars 100%.**

    iii. In the X75, back up one level and set the **HD-TSG Enable** parameter to **On**.

       In the X85, back up one level and set the **SDI 1** or **SDI 2 TSG Enable** parameter to **On**

2. Enable the SD TSG by performing the following steps:

   i. In the X75, enter the **Video Setup** > **Processing** > **SD TSG & Slide** menu.

      In the X85, enter the **Video Setup** > **SD Processing** > **TSG** menu.

   ii. Select the **Keyer/TSG Insert** parameter and ensure it is configured to the correct video path.

   iii. Back up one level and then set the **SD-TSG Select** parameter to **Bars 100%**.

   iv. Back up one level and then set the **SD-TSG Enable** parameter to **On**.

3. Set all audio left-channel outputs to **Tone3/V2A-L** and all audio right-channel outputs to **Tone4/V2A-R** by following: **Audio Setup** > **Routing** > **Output** > (select your audio output).

4. Navigate to **Video/Audio Timing** in the main menu and then set the **V2A Tx Enable** parameter to **Enable**.

To disable the V2A blank insertion, set the **V2A Tx Enable** parameter to **Disable**.

Receiver

The V2A receiver simultaneously monitors the inputs to the X85/X75's audio sources and compares them against one of the unit's video inputs. To configure an X75 or X85 unit for V2A reception, follow these steps:

1. Route the audio inputs containing V2A signals to the SRCs to be used in the unit's final processing (see "Selecting an Audio Source" on page 225 and "Advanced Audio Inputs and Outputs Selection" on page 233 for details).
2. Select a video input under the **Video/Audio Timing** > **V2A Rx Video Src** parameter.

   For analog and HD inputs, the source will be that which is currently selected.

Parameters under **Video/Audio Timing > V2A Signal Status** indicate whether or not a valid V2A test signal is detected on the unit's inputs. If a valid V2A test signal is detected, the relative video delay will be indicated by a series of parameters under the **Video/Audio Timing > Video Delay Status** sub-menu. A series of parameters under the **Video/Audio Timing > Channel Swap Status** sub-menu report whether or not the unit detects a left/right channel swap for stereo pairs.

You can automatically set the measured video delays to the unit's audio delay parameters using the **Video/Audio Timing > Align Leading Audio** parameter. Setting this parameter to **Yes** updates the unit's audio delay parameters with the currently displayed V2A video delays, effectively compensating for measured video/audio timing differences.

NOTE

To prevent processing errors, you must ensure all unused audio channels are routed to **Tone** or **Mute**. The receiver takes approximately 5 seconds to generate audio/video timing information for all of the inputs.

Typical Applications

Figure 8-3 illustrates three typical applications for the timing tool.

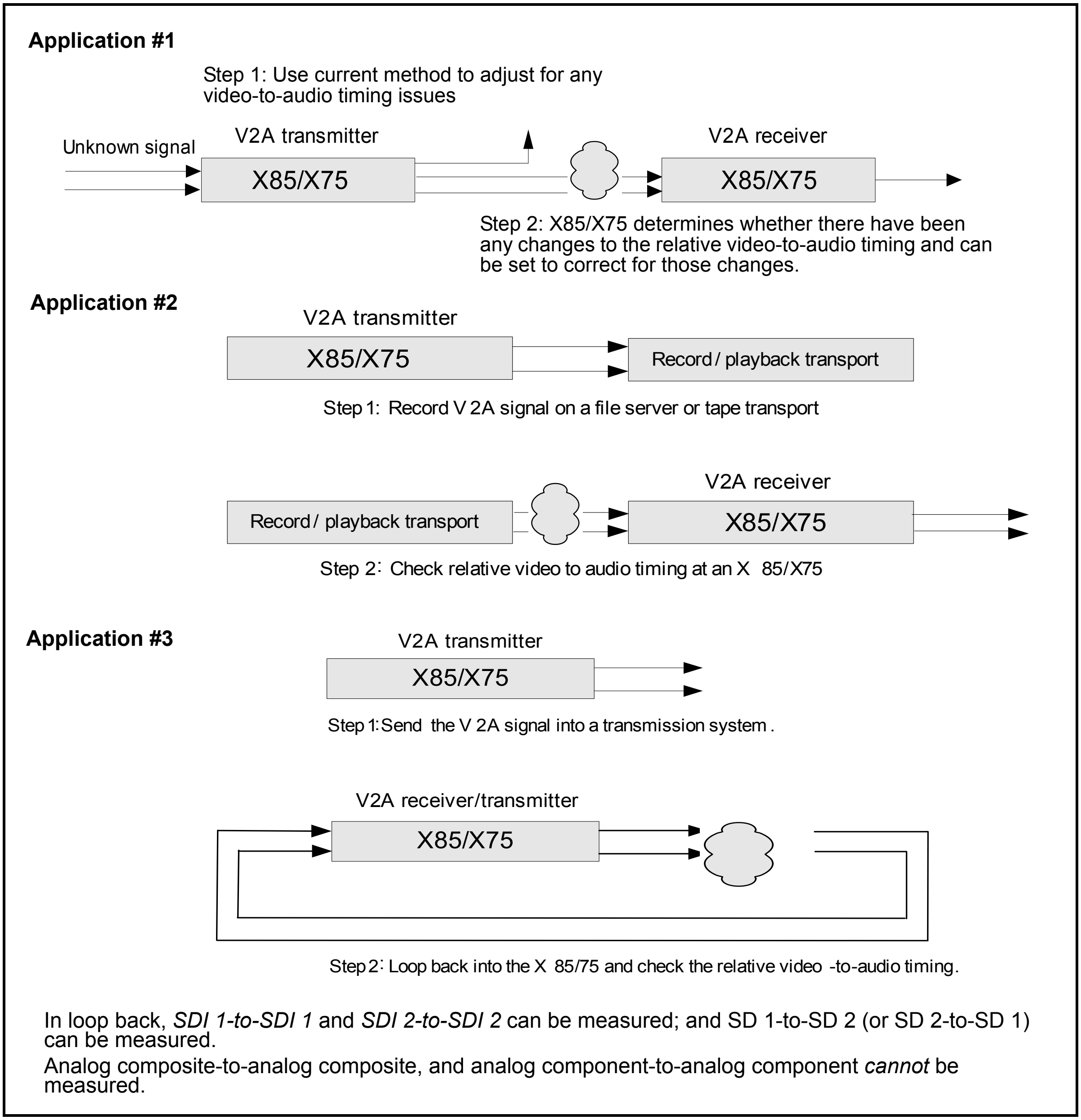


Figure 8-3. X75OPT-V2A Applications

Logo Generator and Inserter

The logo generator and inserter provides on-demand insertion of pre-defined static SD-SDI and HD-SDI logo images.

Logos used by the X85/X75 must be created or saved in the .mg2 file format (LogoCreator software is provided as a utility to convert existing files to .mg2). Graphics files are initially stored on an SD card that is inserted into the slot located on the front of the X85/X75 control panel. The files are then internally transferred to the volatile memory on the SD and HD boards in the X85/X75.

The logos can be provided to the X85 or X75 via CCS Pilot, or Navigator. Initially, the files are stored on an SD card located in the X85/X75's front slot. Later, you will transfer the slides from the SD card to the X85/X75 (see Figure 8-4).

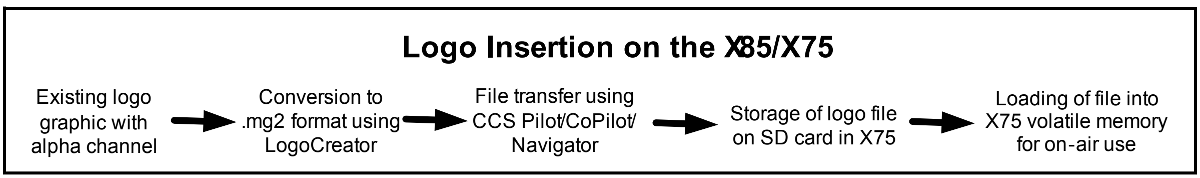


Figure 8-4. Progression of Logo to On-Air Signal

The files used as logos and wings slides must be matched to the intended SD or HD output; the X85/X75's currently output standard determines which file is loaded first. In other words, if the output is set to 1080i, the 1080i HD logo will be the first to load. Once the images have been transferred from the SD card to the volatile memory of the X75, the logo generator/inserter is available for keying the loaded images to the output signal with no noticeable delay.

A logo that has been stored on the X85/X75's volatile memory can be enabled (displayed) using the following devices and applications:

- X85/X75 Web server software
- CCS Pilot and Navigator software
- CCS-enabled control panels, including NUCLEUS, NEO, and other networked X75 panels
- GPIs programmed on the source X85/X75

Basic Steps to Installing Logo Files

If you are starting with existing graphics files, these basic steps are described in the following pages:

1. Install the LogoCreator conversion software from the IconTools 2 CD-ROM.
2. Convert the logos to an .mg2 format.
3. Transfer the files to the SD card via CCS Pilot/Navigator.
4. Set the parameters and load the logo files using the Web server program, CCS-compliant software and control panels, or the X85/X75 control panel.
5. Set the GPI parameters on the X85/X75 (optional).

Step 1: Install LogoCreator Software

All logos used by the X85/X75 must either be generated as .mg2 files or converted to that format. A version of LogoCreator (located on the *IconTools 2* CD-ROM) is provided with the manual for this purpose.

For best results, LogoCreator requires a PC with the following system specifications:

- Intel Pentium III processor at 500 MHz or faster
- 512 MB or more of physical memory (RAM)
- Microsoft® Windows® XP or Windows 2000

If a version of LogoCreator already exists on the PC, ensure that you first uninstall the program and then restart the computer before proceeding with the steps below:

1. Close all other software applications running on the PC and then insert the X85/X75 CD-ROM into the computer's CD-ROM tray.
2. Using Windows Explorer, browse to the CD-ROM contents, and then double-click the **LogoCreator** folder.
3. Double-click **Setup.exe**.
4. When the **IconTools 2 Setup** box appears, click **Next**, and then follow the on-screen installation instructions.
5. Select the **X75/VSG/TSG** button to install LogoCreator.
6. Click **Next** and follow the instructions provided.

Step 2: Convert Files to the .mg2 Format

Using LogoCreator, you need a source image file for the fill portion of your logo, and a source image file for the key portion. The fill is the picture or image you want to overlay onto the program output. The key is the cutout or shape of the desired logo, which may or may not be the same shape as the fill. Using LogoCreator, you will set the fill and key images to the same size (resolution) as the standard of the X85/X75 output. LogoCreator infers the key from the alpha channel in a targa (.tga) file.

After you save the logo, the logo displays in your LogoCreator workspace. To save your logo files using LogoCreator, follow these steps:

1. In LogoCreator, open the **Logo Set-Up** dialog box (Figure 8-5 below).

   When you first open LogoCreator, the **Logo Set-Up** dialog box opens automatically. If the **Logo Set-Up** dialog box is closed, select **File** > **New** to open the dialog box.



Figure 8-5. LogoCreator Setup Dialog Box

NOTE

If you click the **Open** button directly in the **Logo Set-Up** box, the program will only launch files with a .mg2 prefix. If you attempt to open a file with any other prefix, the program will generate error messages.

2. Click the **Logo** button to open the Static Logo dialog box.
3. Use the **Logo ID** box to assign the logo to a specific slot on your IconLogo system.
4. Enter a name for the logo in the **Name** box.
5. Click the **Open** button below the **Logo Image Preview** window. The **Open** dialog box displays.
6. Select your existing logo file and click the **Open** button to open the logo in the **Static Logo** dialog box.

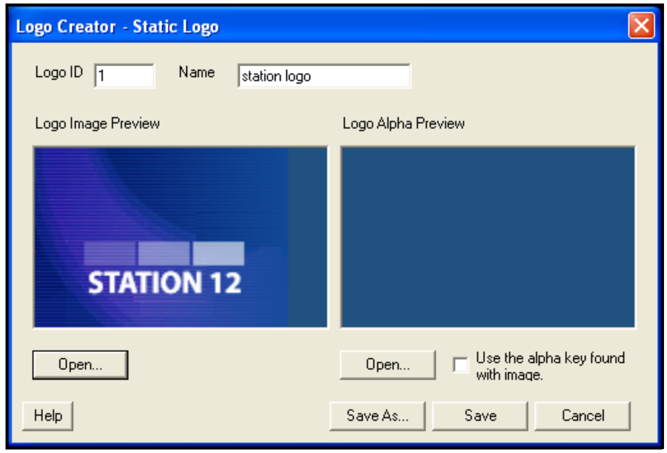


Figure 8-6. Static Logo Dialog Box

- A preview of the composited logo displays in the **Logo Image Preview** area.
- A preview of the image alpha displays in the **Logo Alpha Preview** area if the file contains alpha.

7. Select a file to use as the alpha channel for your logo. You must select a file before you can save the logo.
   - To use the original image's alpha channel, select the **Use the alpha key found with image** checkbox.
   - To use a different image for the alpha channel, clear the **Use the alpha key found with image** checkbox, and then click the **Open** button to select a new file for your alpha channel.

NOTE

An alpha channel is an 8-bit layer in a graphics file format that is used for expressing translucency (transparency). Typically, you define the alpha channel on a per-object basis. Different parts of an object will have different levels of transparency depending on how much background you want to show through.

8. Click the **Save** button in the **Static Logo** dialog box.

   The **Save Logo File** dialog box opens where you can save your logo as a .mg2 file. Once you save the logo as a .mg2 file, the logo displays in the LogoCreator workspace.

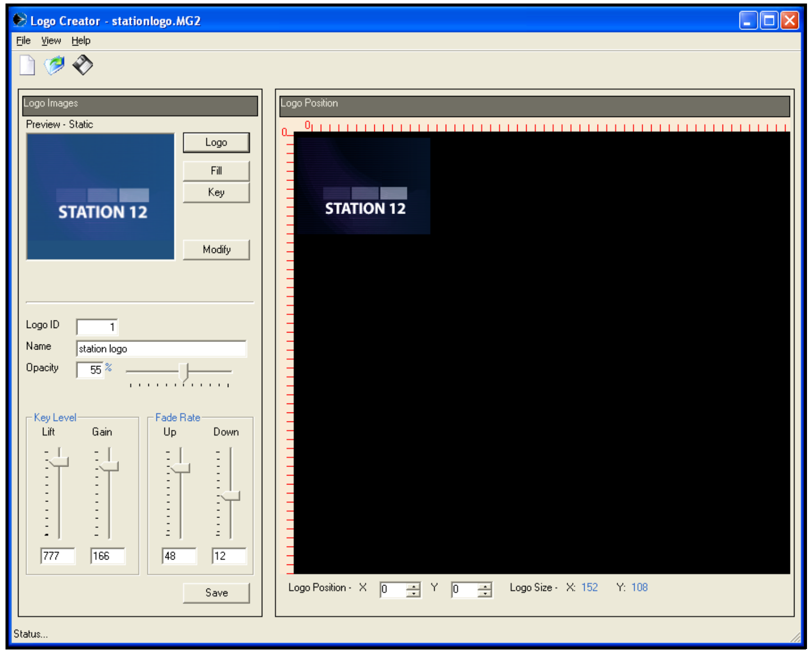


Figure 8-7. LogoCreator Work Space

Once you create an .mg2 logo you can open the file in LogoCreator, set the logo position, and modify specific logo attributes. LogoCreator also allows you to adjust the noise and strength of the key signal and apply fade on/off transitions to the logo.

Opening and Previewing an Existing .mg2 Logo

To make position, opacity, or key level changes to the .mg2 logo, follow these steps:

1. In LogoCreator, select **File > Open** to open the **Open Logo File** dialog box, or if the **Open Logo File** dialog box has already launched, click **Open**.
2. Using the **Open Logo File** dialog box, find and select your .mg2 logo file.
3. Click the **Open** button. The .mg2 logo displays in the LogoCreator workspace (Figure 8-8).

   In the upper left corner (Figure 8-9), you can preview the changes you make using the **Fill**, **Key**, **Opacity**, and **Logo Position** options. (The **Fade Rate** is not functional on the X75.)

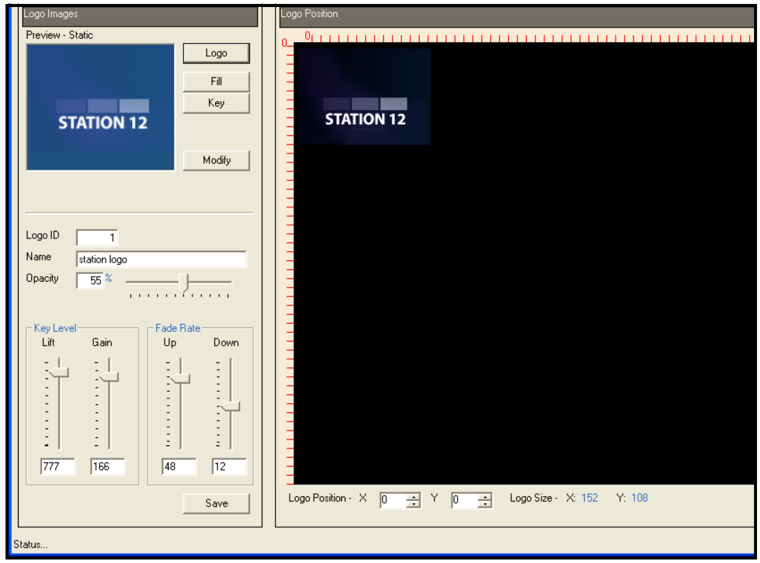


Figure 8-8. Opening a Logo

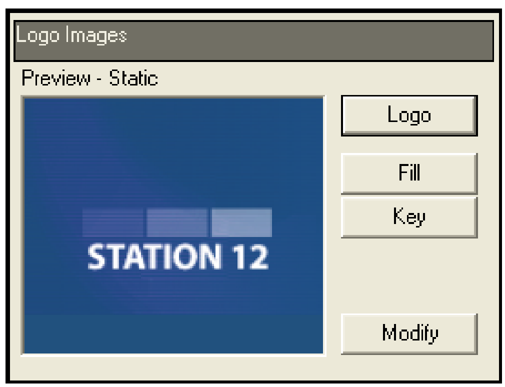


Figure 8-9. Preview Pane

Modifying the Position, Opacity, and Key Level

Using the **Modify** button, you can adjust the logo attributes you defined when you created the logo.

1. Click the **Modify** button to open the **Logo** dialog box, where you defined the logo attributes.
2. Use the options to adjust the logo properties.
3. Click **Save** to save the changes and return to the LogoCreator workspace.

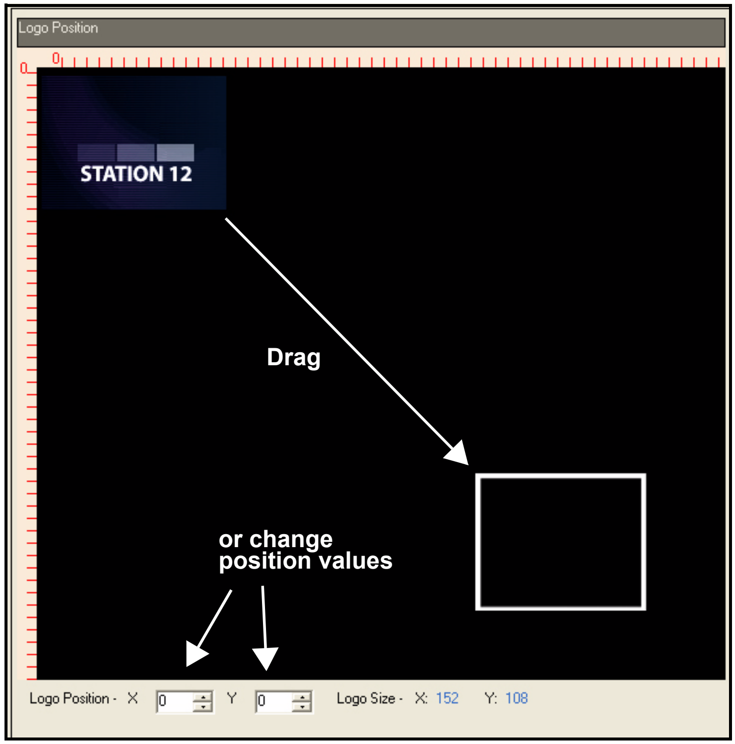


Figure 8-10. Positioning a Logo

To position your logo, either drag the logo to a new position, or use the **Logo Position X** and **Logo Position Y** boxes below the workspace to place your logo in an exact position. You can enter positive or negative values. The **X** value moves the logo horizontally and the **Y** value moves the logo vertically by the set number of pixels.

NOTE

Any X and Y values that you enter or drag (Figure 8-10) are added to the **X Position** and **Y Position** parameter values set later in the X85/X75 interface (see page 188).

The **Opacity** sets the overall transparency level for the composited logo. Use either the **Opacity** field or slider to adjust the logo transparency. **100%** sets the logo as completely opaque. **0**% sets the logo as completely transparent.

The **Key Level** options allow you to adjust the noise and the strength of the key signal. Use the **Lift** slider or field to adjust the noise and the **Gain** slider or field to adjust the strength. **Lift** values range from 0 to 876; **Gain** values range from 0 to 200%.

Step 3: Transfer the Logos to the SD Card

When your logos have been created or converted to the .mg2 format, they can be sent to the X85/X75's SD card, via CCS Pilot or Navigator.

New SD cards must be formatted to the FAT standard with an X85 or X75 before use. Follow this path to format an SD card:

1. Insert the card into the slot at the front of the X85/X75.
2. Press the **Memory** button.
3. Select **SD Card Format**, and then press **Enter**.
4. Click **Yes** when prompted.

A confirmation message will appear briefly. The SD card is now formatted with **Logos** and **Slides** directories. Leave the SD card in the slot.

Sending Files via CCS Navigator

To send the logo files using CCS Navigator, discover the X85/X75, and then remain in **Build** mode while you follow these steps:

1. In the Navigation pane, select your X85 or X75 from the discovered devices (see Figure 8-11 on page 185).

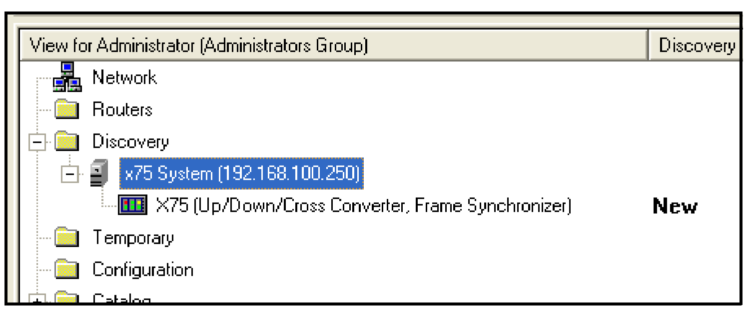


Figure 8-11. Selecting Your X85 or X75 Frame

2. Right-click the X85/X75, and then select **Configuration** from the context menu.

3. In the **Configuration for...** dialog box, click the **File Transfer** tab (see Figure 8-12).

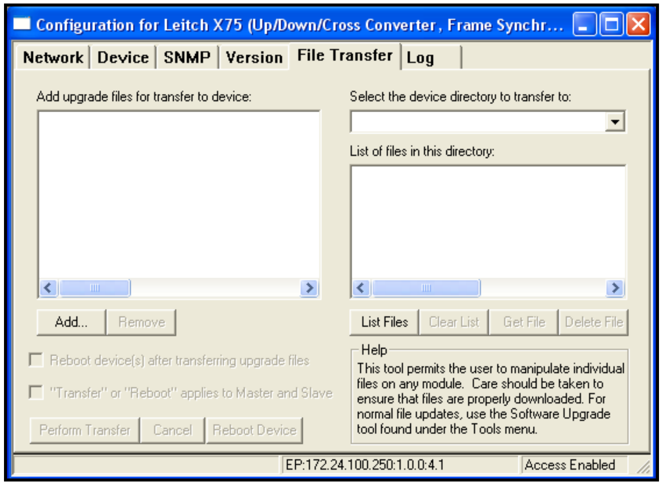


Figure 8-12. File Transfer Tab

4. Click the **Add** button.
5. In the **Add Upgrade File** dialog box, browse to the location of the logo images you want to transfer, and then click **OK**.
6. Under **Select the device directory to transfer to:** type the following:

   `/sd/logos`
7. To transfer the files, select **Perform Transfer**.



Figure 8-13. Perform File Transfer

The progress of the file transfer is indicated at the bottom of the **Configuration for...** dialog box. The X85/X75 does *not* need to be rebooted.

Step 4: Set the Parameters and Load the Logo Files

To make the logos available for on-air use, the appropriate files must be transferred from the SD card to the X85/X75's volatile memory. The volatile memory can store one logo in 1080i, and one logo in 720p. Additionally, it can store one SD-SDI logo, which is shared by the 525 and 625 standards. In SD-SDI, the X75 automatically adjusts the placement of the logo, depending on whether 525 or 625 is the selected standard.

HD-SDI logos are limited to the following image sizes:

- 1080i or 1080p (width x height) < (1920 x 1080) pixels
- 720p (width x height) < (1280 x 720) pixels

A suggested optimal size for a logo is 200 x 200 pixels.

Using the X85/X75 front panel, you can view the list of files currently on the SD card by pressing the **Ctrl** + **Enter** buttons. Then select the file to be displayed by pressing **Enter**.

Table 8-3 on page 187 shows some typical file loading times for logos, and logos with slides. (Slide files will load before logo files.)

NOTE

The X85 can only display either the Wings slide or the logo. Setting **I-Wings Mode** to **Slide** will turn off the logo if it has been enabled.

Table 8-3. Typical SD Card-to-X85/X75 Logo Loading Times

Content	Format	Approximate Load Time from SD Card to X75
Logo Image (Any Size)	SD-SDI	3 seconds
	720p	60 seconds
	1080i and 1080p	90 seconds
Slide and Logo	720p	60 seconds
	1080i and 1080p	90 seconds

Changing Parameters (X75)

To make changes to the *SD-SDI* parameters, select the options in these areas:

- **Video Setup** > **Processing** > **SD TSG & Slide**
- **Video Setup** > **Processing** > **SD Logo**

To make changes to the *HD-SDI* parameters, select the options in these areas:

- **Video Setup** > **HD Processing** > **Wings & Border**
- **Video Setup** > **HD Processing** > **Logo**

NOTE

When using the X85/X75 Web browser, the logo information refreshes when the list is closed, *not* when the list is opened. Ensure that you refresh the page for the latest information.

Changing Parameters (X85)

To make *SD* parameter changes, select the options in these areas:

- **Video Setup** > **SD Processing** > **TSG**
- **Video Setup** > **SD Processing** > **Logo**

To make *SDI* parameter changes, select the options in these areas:

- **Video Setup** > **SDI Processing** > **SDI *x*** > **TSG**
- **Video Setup** > **SDI Processing** > **SDI *x*** > **Logo**
- **Video Setup** > **SDI Processing** > **SDI 1** > **Wings & Border**

NOTE

When using the X85/X75 Web browser, the logo information refreshes when the list is closed, *not* when the list is opened. Ensure that you refresh the page for the latest information.

HD Logo Fading (X75 Only)

Using the **HD Logo** parameter (**Video Setup** > **SDI Processing** > **HD** > **Logo**), you can program HD logos to fade in and out, and to have a specific duration. The fade-out and duration settings are overriden when the **Display Always** option is enabled. However, the **Display Always** setting does not affect the fade-in setting.

In 720p, 1080i, and 1080p, there are approximately 100 levels of fading (frames) available for a 1/32 screen logo, and 50 levels (frames) available for a 1/16 screen logo. The logos fade at a rate of 4 times a second. Therefore, longer fade durations create smoother fades.

To enable a fade-in and fade-out for an HD logo, the logo must be small enough to load a set of frames with increasing/decreasing levels of opacity. Up to 100 frames are generated to use in the fade-in/fade-out operation. (If fades are *not* needed, the entire memory can be loaded with a large single logo image.) The fading effect works best when the fade duration is between 2 and 3 seconds.

Table 8-4 on page 189 provides some typical examples of HD logo fade durations. At this time, the X75 does not support logo fading over I-Wings.

Table 8-4. Examples of Fading Times

Example	Fade In Duration	Fade Out Duration	Total Duration of Logo	Display Always Parameter Setting	Result
1	3 s	3 s	10 s	Off	Logo appears for a total of 10 seconds, including 3 seconds of fading in and 3 seconds of fading out
2	3 s	3 s	10 s	On	Logo fades in for 3 seconds, holds at the given opacity level, and does not disappear because Display Always is enabled
3	3 s	0 s	0 s	Off	Logo fades in for 3 seconds and then disappears
4	0 s	3 s	0 s	Off	Logo cuts in and fades out for 3 seconds
5	0 s	3 s	0 s	On	Log cuts and holds

Once you have made all of the necessary parameter changes as described in this section, you will enter the name of your logo in the **Filename** field. This action triggers the SD card to load your logo onto the volatile memory of the X85/X75. The read-only **Logo Status** parameter shows the progress of the file as it transfers from the SD card to the X85/X75. During the transfer, the controls may respond more slowly than usual.

Reloading Image Files

If there are existing logos and slides currently stored on the X75 volatile memory, the existing files will be overwritten when you select new files. If you remove power from the X85 or X75, the loaded images will be lost. However, the unit will automatically reload the previously selected files after a short delay (a file is saved once it is selected).

In certain situations, the logo may temporarily disappear from the program output of the X85/X75. This may happen during the following events:

- You make changes to the ARC settings in the X85/X75 after the images have been loaded
- You switch the X85/X75's HD-SDI output from a crossconverted HD source (for example, 720p to 1080p) to unconverted video (for example, SD-to-HD)

To stop an image file from automatically loading to the volatile memory, press the **Default** button on the X85/X75 control panel, in CCS software, or in the X85/X75 Web browser. This action clears the **Filename** field.

Using the X85/X75 front panel, you can view the list of files currently on the SD card by pressing the **Ctrl** + **Enter** buttons. Then select the file to be displayed by pressing **Enter**.

The read-only **Load Status** parameters show the progress of the file as it transfers from the SD card to the X85/X75. During the transfer, the controls may respond more slowly than usual.

Step 5: Make the GPI Settings (Optional)

As a final step, you may need to set triggers to activate your logos. The GPI inputs are internally pulled HIGH. The external contact closure to ground will trigger functions you have assigned.

Follow this path to enable GPIs for both the SD- and HD-SDI logos:

System Config > **Setup** > **GPI-1 Function** or **GPI-2 Function** > **SD Logo Enable** or **HD Logo Enable**.

NOTE

When using the logo insertion feature, the GPI must stay grounded for the logo to display. In this instance, the trigger does not act as a toggle.

For instructions on how to add a parameter and assign it as a GPI input in a Favorites list, see "Using the FAV1 and FAV2 Function" on page 226.

In the event that a file has not been correctly loaded into the X75, or has been given the wrong name, CCS will display an **Image Not Found** major alarm. This alarm will clear itself when the problem is resolved.

I-Wings Integrated Graphics Content Insertion

I-Wings integrated graphics content insertion makes it possible to key an HD graphic or video into the sidebar portion of the output image raster (or anywhere else in the area that is not covered by the SD content). This option is useful for applications where upconversion of SD-SDI 4:3 content is being performed, and insertion of additional content is required in the sidebars of the 16:9 upconverted image raster (see Figure 8-14 on page 193).

As described in Table 8-3 on page 187, the I-Wings feature may take up to 90 seconds to load into the X85/X75 from the SD card.

To set up the internal wings feature, follow these steps:

X85

1. Set your aspect ratio settings as required, using CCS software, or by following this control panel path: **Video Setup > SDI Processing > SDI 1 >ARC.**
2. Set the "wings" .mg2 source image from **Video Setup > SDI Processing > SDI 1 > Wings and Border > ImgFile**, and the background for the wings from **Video Setup > SDI Processing > SDI 1 > Wings and Border > I-Wings Mode > Slide, Fill Color,** or **Live** (video).

If you select **Slide** as the source for the wings content, you can set the content to be in the foreground or the background (**Video Setup > SDI Processing > SDI 1> Wings & Border > Slide Priority**).

The center portion of the I-Wings image appears as the SDI 1 input signal; the wings appear as SDI 2 input. The X75 supports static wings information; X85 can include live video as the wings content.

X75

1. Set your aspect ratio settings as required, using CCS software, or by following this control panel path: **Video Setup > Processing > ARC (HD Out).**
2. Set the "wings" .mg2 source image from **Video Setup > Processing > HD Wings & Border > Wings Slide**, and the background for the wings from **Video Setup > Processing > HD Wings & Border > Fill Color.**

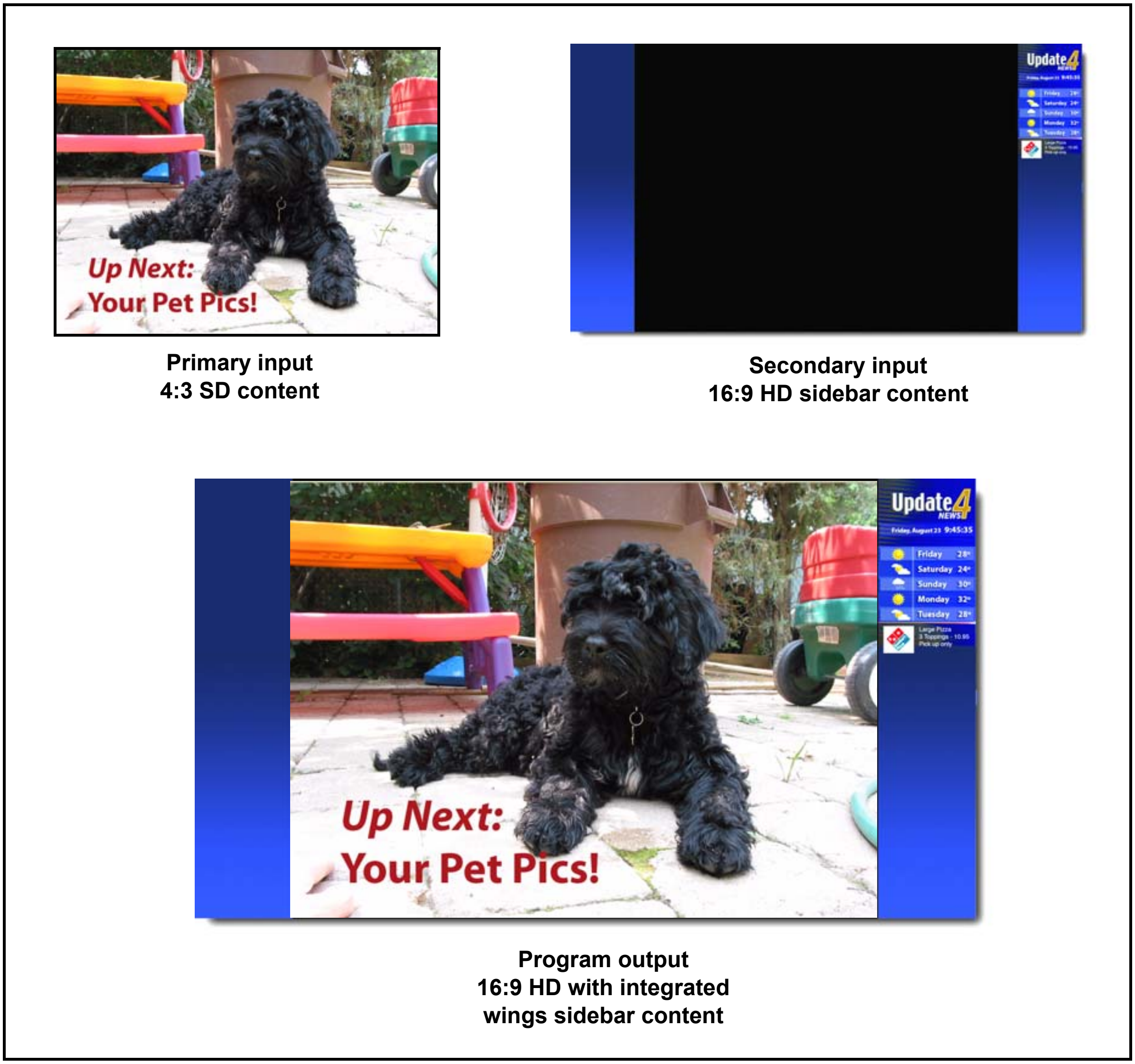


Figure 8-14. Creating the HDTV I-Wings Effect

SDI (HD) Processing Bypass Mode

Using the **SDI Processing Bypass** (X85) or **HD Processing Bypass** (X75) feature, you can switch back and forth between bypass and normal modes.This mode bypasses the HD ARC and HD logo insertion, and instead, routes the HD input directly to and from the frame synchronizer. The maximum total delay specifications are reduced by the scalar propagation delay when in **SDI** or **HD Processing Bypass.** (For maximum total delay specifications, see the *X85/X75 Propagation Delay* tables found in the *X85/X75 System and Control Panel Documentation* CD-ROM.)

During **SDI** or **HD Processing Bypass**, frame synchronization and timing of the signal continue as normal, and the seven-frame bulk delay can also be added, using the **SDI** or **HD Input Frame Delay** parameter.

The **SDI** and **HD Processing Bypass** parameters operate differently than the **SD** (relay) **Bypass** described on "Using the Relay Bypass Function" on page 229. While the **SD Bypass** mode can be controlled by the **Bypass** button on the front panel, this button is *not* used for **SDI** or **HD Processing Bypass**—which must be enabled using the parameters described below.

X85

- **Video Setup** > **SDI Processing** > **SDI *x*** > **SDI *x* Processing Bypass** > **On** This setting enables the bypass mode; the HD output is routed directly from the HD frame synchronization circuit.
- **Video Setup** > **SDI Processing** > **SDI *x*** > **SDI *x* Out H-Phase**

  This parameter adjusts the horizontal phase of the HD frame sync when in **HD Processing Bypass** mode.
- **Video Setup** > **SDI Processing** > **SDI *x*** > **SDI *x* Out V-Phase**

X75

- **Video Setup** > **Processing** > **HD Processing Bypass** > **On** This setting enables the bypass mode; the HD output is routed directly from the HD frame synchronization circuit.
- **Video Setup** > **Processing** > **HD Bypass H-Phase**

  This parameter adjusts the horizontal phase of the HD frame sync when in **HD Processing Bypass** mode.
- **Video Setup** > **Processing** > **HD Bypass V-Phase**

During the period when **SDI** or **HD Processing Bypass** is enabled, inactive parameters will display the abbreviation **N/A** and below that, the message **Disabled** will appear on the front panel. The video input standard cannot be changed after **SDI** or **HD Processing Bypass** is enabled.

NOTE

Previous editions of the *Installation and Operation Manual* incorrectly state that the **Bypass** button flashes during **SD Bypass**. The manual should state that the **Bypass** button is lit (but does not flash) during **SD Bypass**.

The **SDI** or **HD Processing Bypass** circuit does not interact with—or update—the routing parameters. Therefore, it should not be used as a means of configuring the video path or routing a signal. Ensure that you first configure the video M-Path and routing before turning the bypass on.

Aspect Ratio Conversion

There are three sets of aspect ratio control parameters:

- **Video Setup > SDI Processing > SDI 1 > ARC** for SDI 1 output (for X75 user: Video Setup > SDI Processing > HD > ARC)
- **Video Setup > SDI Processing > SDI2 > ARC** for SDI 2 output
- **Video Setup > SD Processing > ARC >** for SD output

Setting a Custom, Standard, or Automatic Aspect Ratio

To select an aspect ratio for the output image, use **ARC Preset** (**Video Setup > SD Processing > ARC** or **Video Setup > SDI Processing > SDI x > ARC**).

The **ARC Preset** parameter has the following options.

- Custom
- Standard ARCs
  - Anamorphic
  - 4:3 Pillar Box
  - 14:9 Pillar Box
  - 16:9 Cut
  - 4:3->21:9 Ltr
  - 16:9 Letter Box
  - 14:9 Letter Box
  - 4:3 Cut
  - 16:9->21:9 Ltr
- Automatic ARCs
  - AFD
  - AFD - ALTR
  - VI
  - VI - ALTR
  - WSS
  - WSS - ALTR

Depending on the current conversion mode (Up, Down, Cross, or SD-ARC), different subsets of these options are in effect. Thus, for example, an ARC setting that is visible in upconversion may not be visible in downconversion.

Setting a Custom Aspect Ratio

You can make custom ARC settings by making selections in the following paths. When you make changes in these parameters, the **Custom** option is automatically enabled.

X85

- **Video Setup** > **SD** or **SDI *x* Processing** > **SD** or **SDI x** > **ARC** > **AdvancedUser**
- **Video Setup** > **SD** or **SDI *x* Processing** > **SD** or **SDI x** > **ARC** > **Variable**
- **Video Setup** > **SD** or **SDI *x* Processing** > **SD** or **SDI x** > **ARC** > **InputCrop**

X75

- **Video Setup** > **SD** or **HD Processing** > **SD** or **HD** > **ARC** > **Advanced**
- **Video Setup** > **SD** or **HD Processing** > **SD** or **HD** > **ARC** > **Variable**
- **Video Setup** > **SD** or **HD Processing** > **SD** or **HD** > **ARC** > **InputCrop**

NOTE

When those individual values matched a particular pre-defined standard aspect ratio, **ARC Preset** will be changed to reflect that matching standard aspect ratio.

Setting an Aspect Ratio Automatically

Active Format Description (AFD), Video Index (VI), and Wide-Screen Signalling (WSS) are different standards for embedding data in the video stream to automatically control aspect ratio. When you set **ARC Preset** to **AFD**, **AFD-ALTR**, **VI**, **VI-ALTR**, **WSS**, or **WSS-ALTR,** the X85/X75 will make ARC conversions according to the upstream AFD, VI, or WSS code.

The **x-ALTR** versions of these options interpret the code in an alternative way.

Types of Automatic ARCs

The X85/X75 recognizes three types of automatic ARC standards.

Active Format Description (AFD) transmits data in the VANC space of the SDI signal, enabling both 4:3 and 16:9 television monitors to optimally present video with preset ARC and safe area information. Without AFD, converted video may appear distorted or “cut off” when it appears on different monitors.

See Figure 8-15 on page 198 for a comparison of AFD and non-AFD aspect ratio conversion.

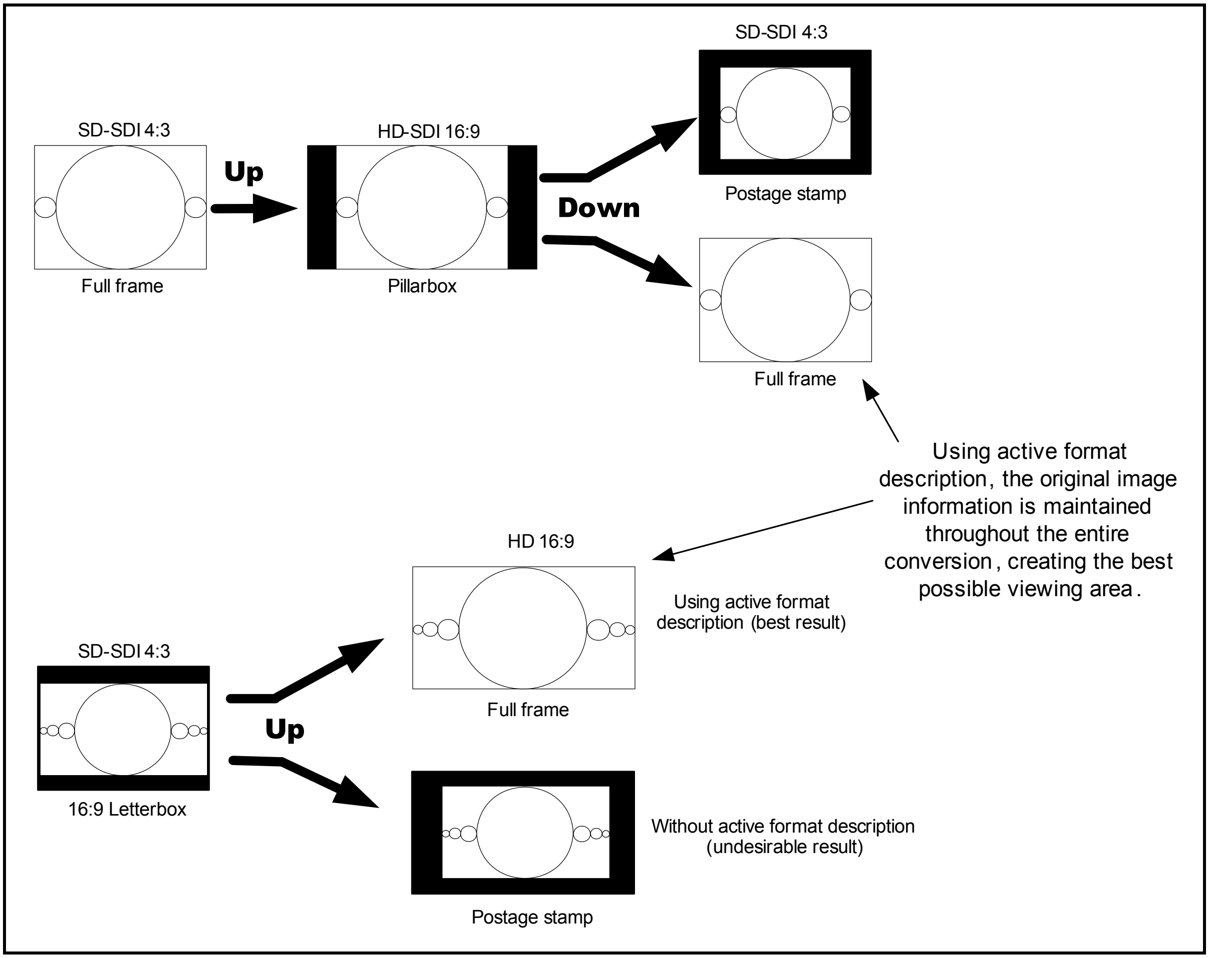


Figure 8-15. AFD and Non-AFD ARC

Video Index (VI) is embedded code in 525-line and 625-line component digital video signals. This code makes it possible for picture and program related source data to be carried in conjunction with a video signal.

Wide-Screen Signalling (WSS) is embedded code in 625-line system. It contains information on the aspect ratio range of the transmitted signal and its position as it would appear on a conventional 4:3 display.

Figure 8-17 on page 200 and Figure 8-18 on page 201 show the different AFD, VI, and WSS code selections. Figure 8-16 on page 199 explains the meanings of the diagrams.

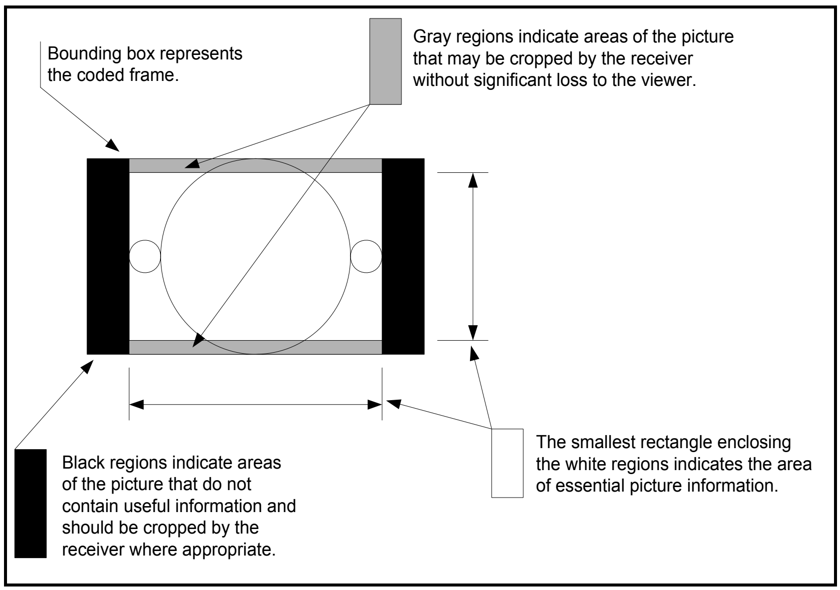


Figure 8-16. AFD Diagram Explanation

AFD 4:3 code and description

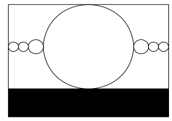
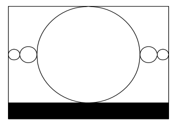
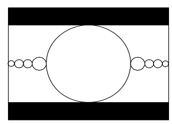
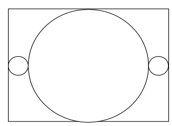
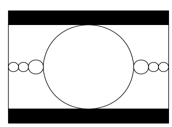
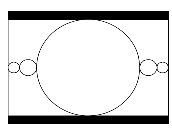
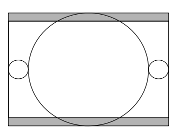
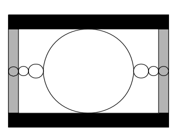
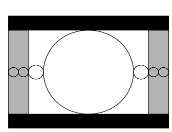
WSS name	AFD and VI Select parameter options	Illustration in a 4:3 coded frame	Description
16:9 Top	16:9 Top		Image with a 16:9 aspect ratio as letterbox at the top of a 4:3 coded frame
14:9 Top	14:9 Top		Image with a 14:9 aspect ratio as letterbox at the top of a 4:3 coded frame
>16:9	>16:9 in 4:3		Image with aspect ratio greater than 16:9 as a vertically centered letterbox in a 4:3 coded frame
Full Frame	4:3 Full		Image is full frame, with an aspect ratio that is the same as the 4:3 coded frame
16:9 Center	16:9 L		Image with a 16:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame
14:9 Center	14:9 L		Image with 14:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame
Full A 14:9	4:3 A 14:9		Image with a 4:3 aspect ratio and with an alternative 14:9 center in a 4:3 coded frame
None	16:9 L A 14:9		Image with a 16:9 aspect ratio and with an alternative 14:9 center as a vertically centered letterbox in a 4:3 coded frame
None	16:9 L A 4:3		Image with a 16:9 aspect ratio and with an alternative 4:3 center as a vertically centered letterbox in a 4:3 coded frame

Figure 8-17. AFD Descriptions for 4:3

AFD 16:9 code and description

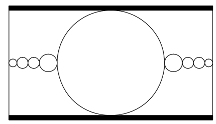
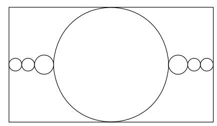
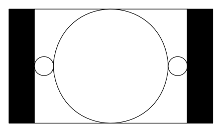
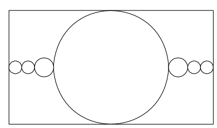
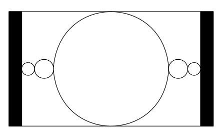
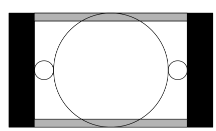
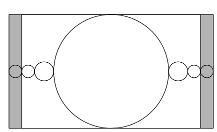
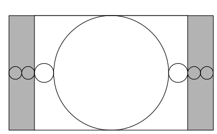
WSS name	AFD and VI Select parameter options	Illustration in a 16:9 coded frame	Description
None	>16:9 in 16:9 AFD Code: 0100		Image with aspect ratio greater than 16:9 as a vertically centered letterbox in a 16:9 coded frame
Anamorphic	16:9 Full AFD Code: 1000		Image is full frame, with an aspect ratio that is the same as the 16:9 coded frame
None	4:3 P AFD Code: 1001		Image with a 4:3 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame
None	16:9 Prtctd AFD Code: 1010		Image is full frame, with a 16:9 aspect ratio and with all image areas protected
None	14:9 P AFD Code: 1011		Image with a 14:9 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame
None	4:3 P A 14:9 AFD Code: 1101		Image with a 4:3 aspect ratio and with an alternative 14:9 center as a horizontally centered pillarbox image in a 16:9 coded frame
None	16:9 A 14:9 AFD Code: 1110		Image with a 16:9 aspect ratio and with an alternative 14:9 center in a 16:9 coded frame
None	16:9 A 4:3 AFD Code: 1111		Image with a 16:9 aspect ratio and with an alternative 4:3 center in a 16:9 coded frame

Figure 8-18. AFD Descriptions for 16:9

Examples of Automatic Aspect Ratio Conversion

You can enable the automatic ARC control by setting the **ARC Preset** parameter to **AFD**, **AFD-ALTR**, **VI**, **VI-ALTR**, **WSS,** or **WSS-ALTR**. When you set **ARC Preset** to **AFD** and the upstream video has AFD code embedded in it, the system will conduct arcing accordingly and generate new downstream AFD code accordingly.

For example, in upconversion mode, when the upstream signal has an AFD code of **1000**, this indicates the output will be a full frame 4:3 image. The X85/X75 creates a **4:3 Pillar Box** arc, and the output HD image becomes a 4:3 pillar box. The resulting AFD code becomes **1001** (4:3 (center).

In an another example, the X85/X75 is in downconversion mode. The upstream signal has AFD code **1111,** indicating a 16:9 ratio with alternative 4:3 center. If you set the **ARC Preset** parameter to **AFD**, the X85/X75 creates an output of 16:9 letter box and the resulting AFD code becomes **1111**. If you set **ARC Preset** to **AFD-ALTR**, system does a center cut arcing, the output becomes 4:3 full and the resulting AFD code becomes **1000**. This result is commonly used in the USA.

Figure 8-19 on page 206 to Figure 8-22 on page 209 show all of the conversion patterns.

In the event that the current ARC is controlled by AFD, VI or WSS, and this data disappears from the input signal, the system provides you with two options:

- Keep the current aspect ratio as set by the last AFD, VI, or WSS data.
- Reset to the aspect ratio settings that were in use before the AFD, VI, or WSS data took control

The **Auto ARC Reset** parameter controls this feature. Select **Yes** to have the module reset to older values in the event of loss of data; select **No** (the default) to retain the current ARC.

Some AFD code “encourages” cropping out some of the active video area. To prevent this, set **AFD Crop Enable** to **Disable**.

The **Out Aspect Ratio** parameter controls the output aspect ratio of the SD signal, and it will affect how the AFD performs the automatic conversion. (It is assumed that an SD signal may be either 4:3 or 16:9, but an HD signal will always have a 16:9 ratio.) The default value of the **Out Aspect Ratio** parameter is **4:3.**

The **Auto ARC Reset**, **AFD Crop Enable**, and **Out Aspect Ratio** can be found at:

- **Video Setup** > **SDI Processing** > **SDI 1** > **ARC** > **Advanced** for SDI 1 output
  (for X75 users, the path is **Video Setup** > **SDI Processing** > **HD** > **ARC** > **Advanced**)
- **Video Setup** > **SDI Processing** > **SDI 2** > **ARC** > **Advanced** for SDI 2 output
- **Video Setup** > **SD Processing** > **ARC** > **Advanced** for SD 1 and SD 2 output

Incoming AFD, VI and WSS Detection

The X85/X75 detects AFD, VI and WSS data that is embedded in the incoming video. You can read this information at the following parameters:

- AFD Present
- VI Scan Present
- VI AFD Present
- WSS Present

The paths for these parameters are:

- **Video Setup** > **De-embedder** > **SD1 Input** for SD1 input
- **Video Setup** > **De-embedder** > **SD2 Input** for SD2 input
- **Video Setup** > **De-embedder** > **SDI1 Input** for SDI 1 input
  (for X75 users, the path is **Video Setup** > **De-embedder** > **HD Input**)
- **Video Setup** > **De-embedder** > **SDI 2 Input** for SDI 2 input

Output AFD, VI and WSS

You can insert AFD, VI and WSS data into an output video stream either manually or automatically. This function is controlled by the **AFD Control, VI Control,** and **WSS Control** parameters found in the following paths:

- **Video Setup** > **Embedder** > **Analog Output** for Composite output (WSS only)

- **Video Setup** > **Embedder** > **SD 1 Output** for SD1 output
- **Video Setup** > **Embedder** > **SD 2 Output** for SD2 output
- **Video Setup** > **Embedder** > **SDI 1 Output** for SDI 1 output (for X75 users, the path is **Video Setup** > **Embedder** > **HD Output**)
- **Video Setup** > **Embedder** > **SDI 2 Output** for SDI 2 output
- **Video Setup** > **Embedder** > **SD** (from HD) **Output** for SD output coming from SDI 1 or SDI 2 input or SD 1/SD 2 input that's routed through processing by setting **Video Setup > SD Processing > ARC > SD-ARC Insert**

Different options of **AFD Control**, **VI Control** and **WSS Control** will have different functions, including the following:

- Off
  (There is not embedding of any code)
- Insert Auto
  (The code selected by the system will be embedded. If **ARC Preset** is set to **AFD**, **AFD-ALTR**, **VI**, **VI-ALTR**, **WSS**, and **WSS-ALTR**, the resulting arcing code is then selected by the system. If **ARC Preset** is set to some pre-defined aspect ratio, code related to that aspect ratio is then selected.)
- Insert Custom
  (The code selected from **AFD Select**, **VI Select**, **WSS Select** will be embedded into the output video. These parameters are located in the same path as **AFD Control,** etc.)
- Bypass
  (The original code from input video—if any—will be re-embedded into the video stream when the input/output video standards match)

The current output status and code are shown by the **AFD Output**, **VI Output**, and **WSS Output** whether you select the code manually, or the system automatically selects it.

Additionally, if you are using VI according to the SMPTE proposed RP-186+ standard as of January 11, 2007, you must ensure you have enabled the standard by setting SD Out VI with AFD, (located in the same path as the other output control).

NOTE

There is a redundant set of embedders in the **Video Setup > Embedder > SD (From HD) Output** path. This set is there for better timing control of the AFD, VI, and WSS data embedding when the video source for the SD 1 or SD 2 output is coming from SDI 1 or SDI 2 input. When the paths match, and this set of embedders is embedding, the embedder set for SD 1 or SD 2 will not function

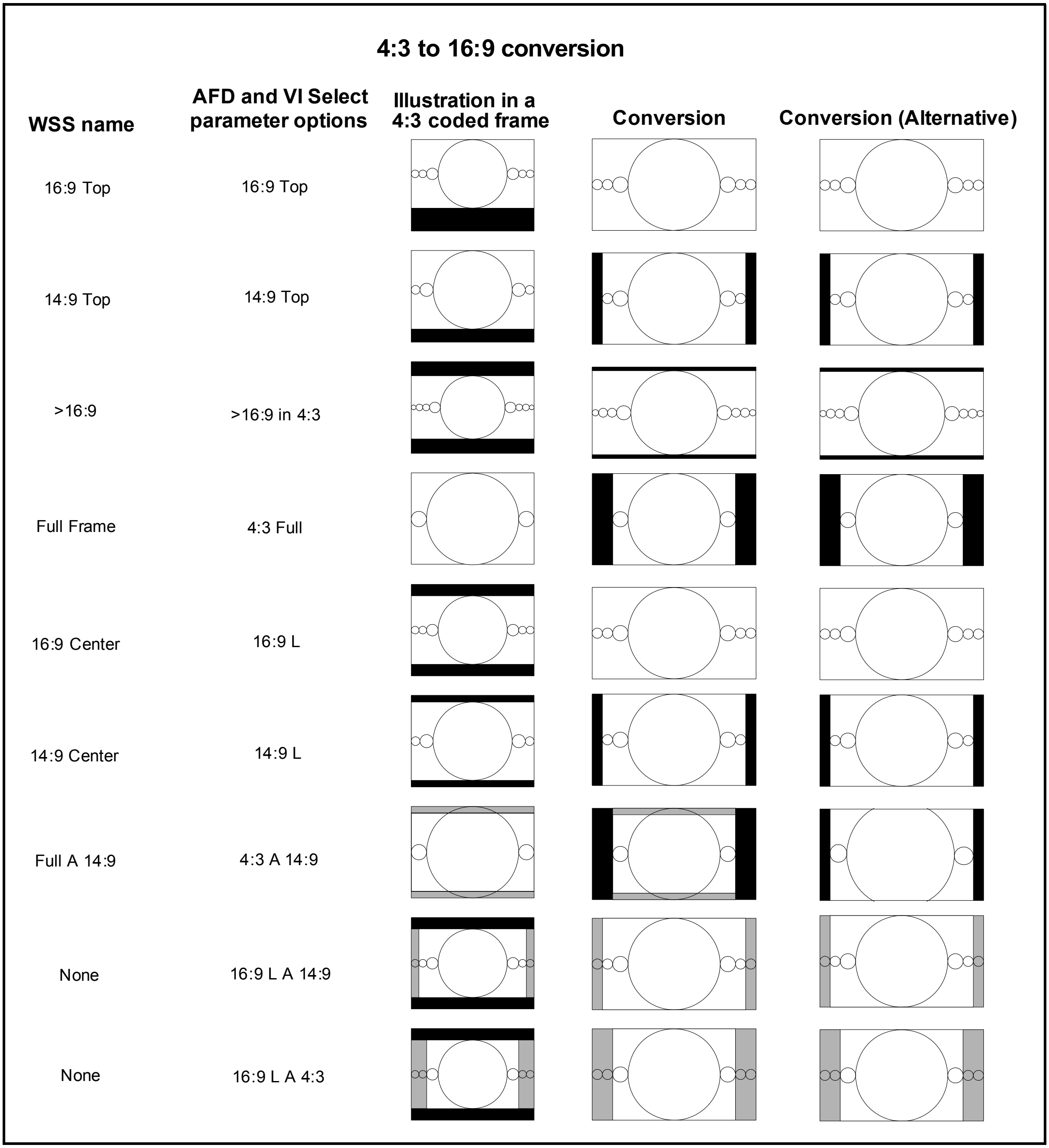


Figure 8-19. 4:3 to 16:9 Conversion

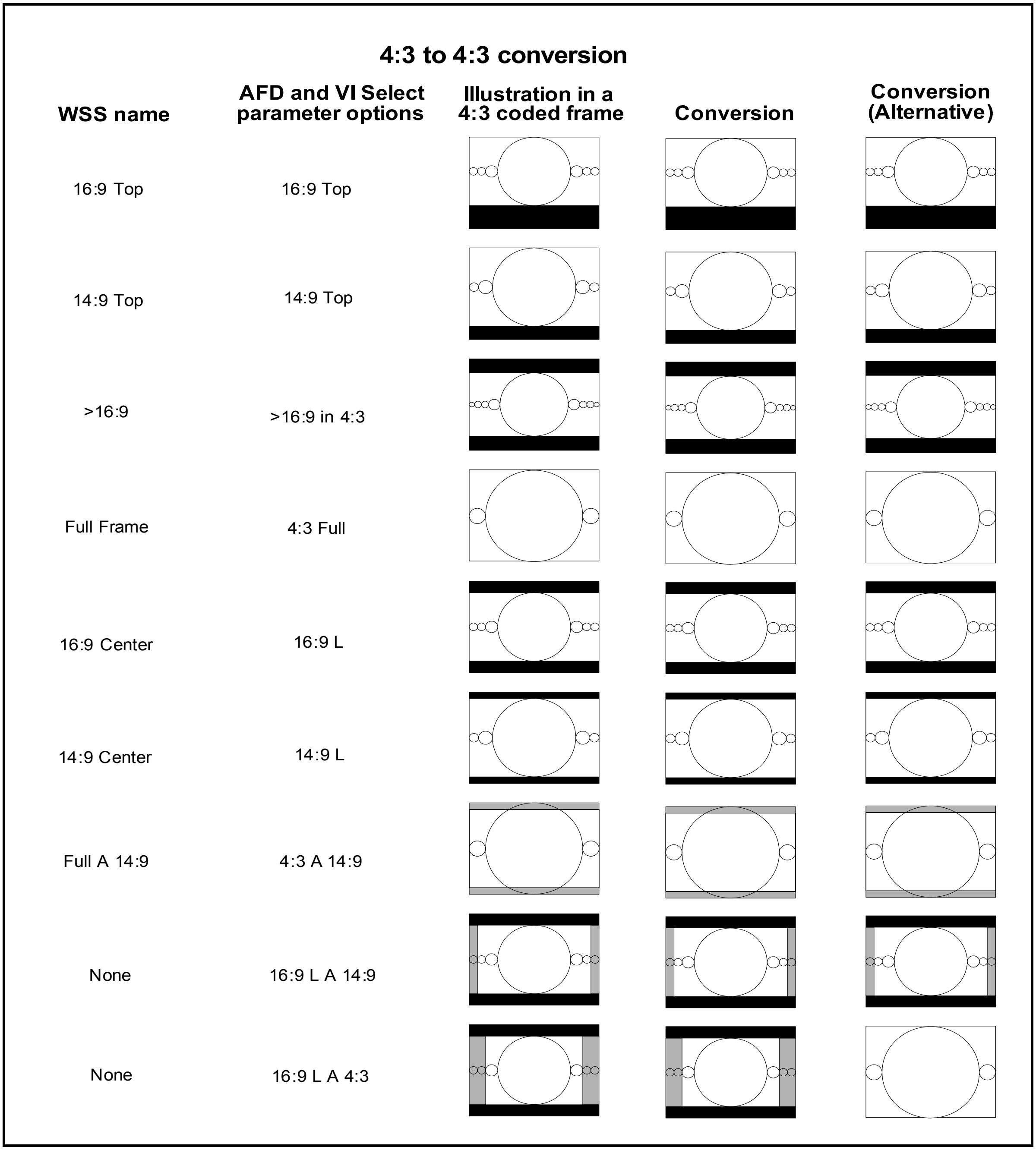


Figure 8-20. 4:3 to 4:3 Conversion

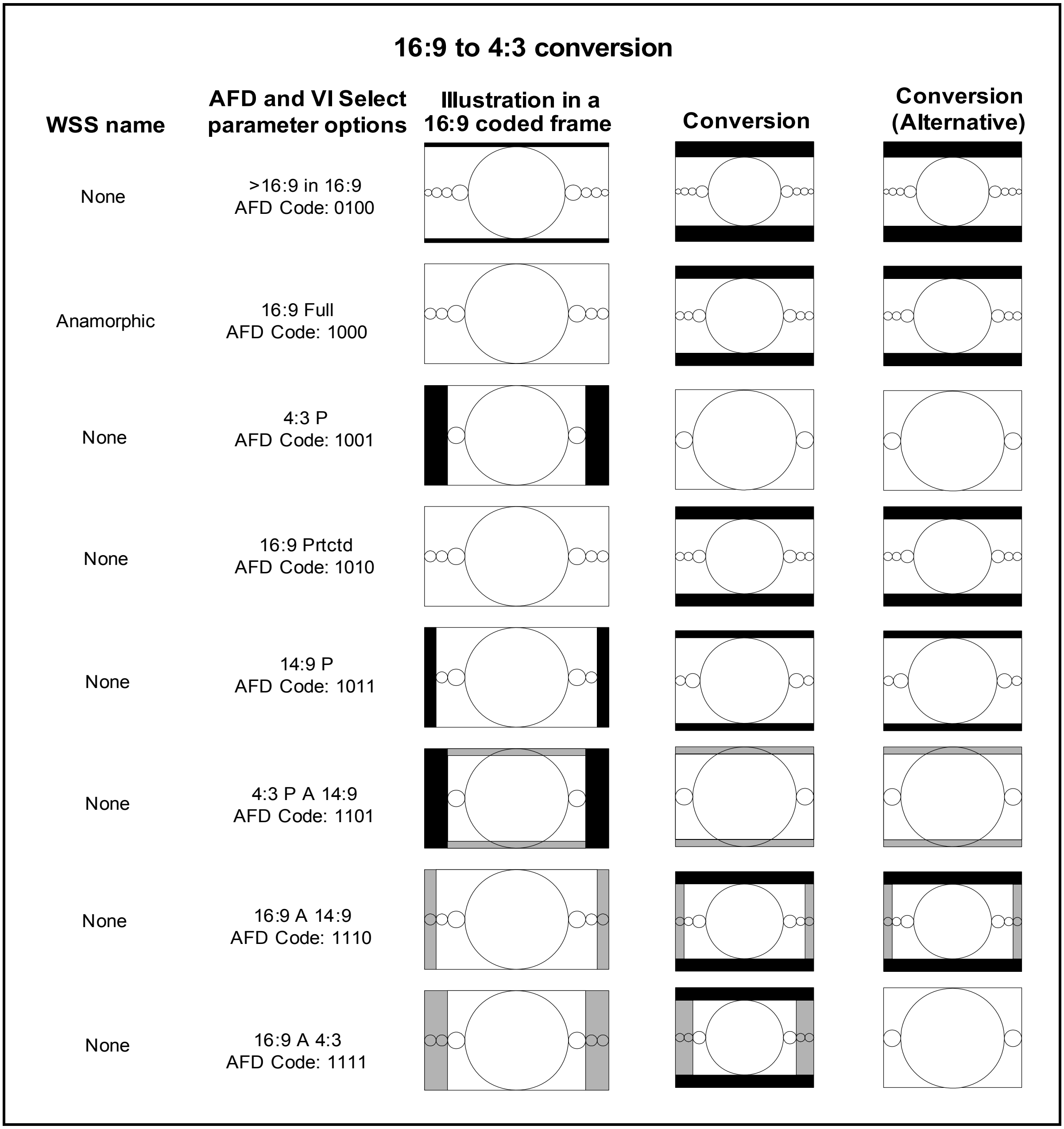


Figure 8-21. 16:9 to 4:3 Conversion

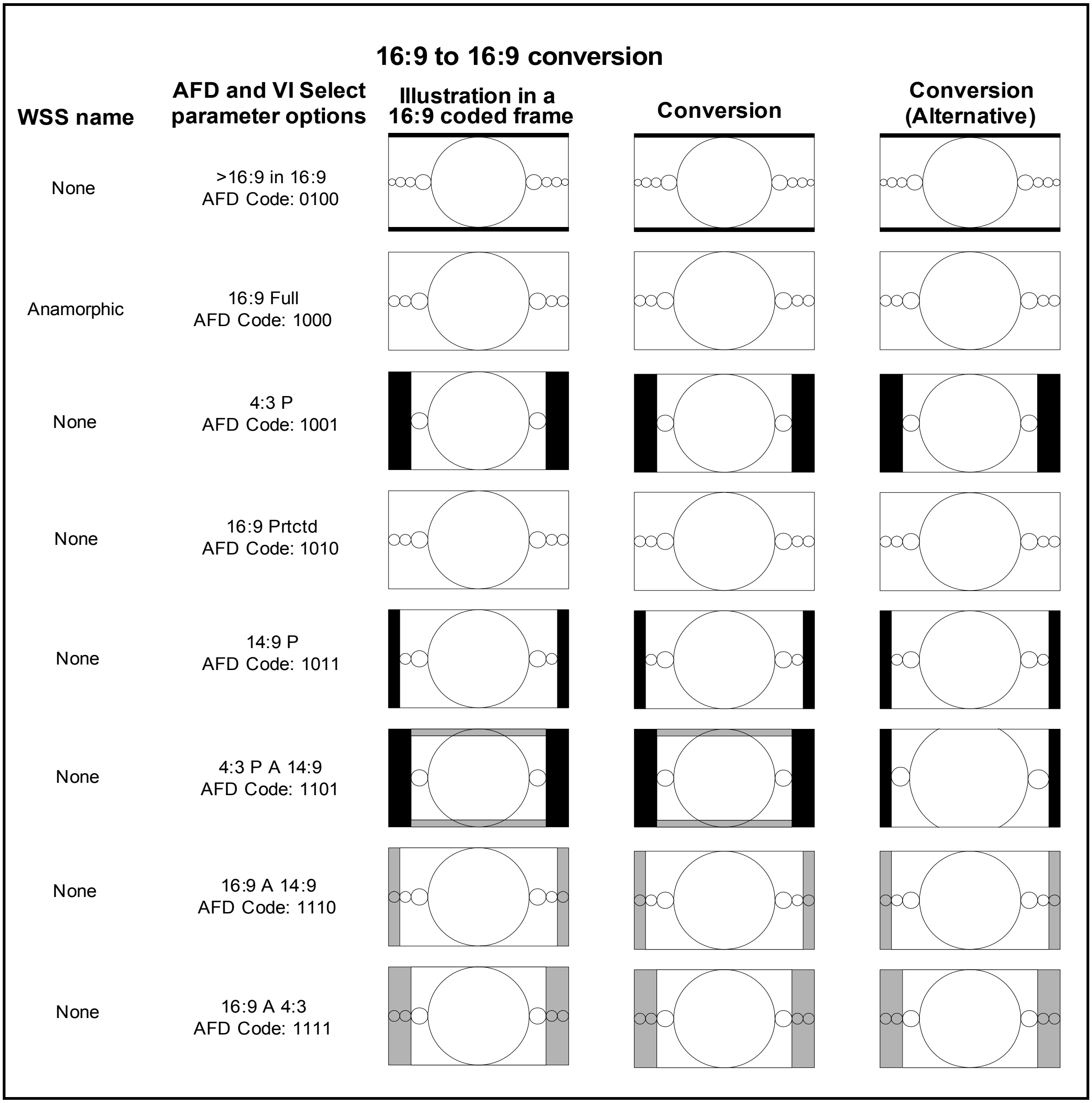


Figure 8-22. 16:9 to 16:9 Conversion

Closed Captioning and DVB Teletext Captioning

Although North America has dedicated standards for closed captioning of video (EIA-608 and 708), many countries in Europe and elsewhere have not yet adopted formal standards. For these countries, closed captioning is part of the DVB Teletext System as described in ITU-R BT-653-3. These specifications define all Teletext Systems (Systems A, B, C, D) used in the world and are also known as the World System Teletext (WST). A Teletext system is made of several pages of various data information and CC data is described in one these pages. System B is used in Australia, the UK, and Germany, among other countries.

Australian closed captions are inserted on line 21/334 in analog PAL broadcast signals, as per the ITU-R BT-653-3. When analog PAL is produced or converted to SDTV (625 digital), a digitized version of the closed captioning appears on line 21/334 (in the same way line 21 on NTSC signals is digitized and appears on the line 21 of SD-SDI signals). The document proposed by Free TV Australia indicates how to carry this CC data into the VANC area of SD-and HD-SDI signals by use of the SMPTE 334M VANC embedding protocol. For digital broadcasting, Australia intends to use the ETSI EN 300 472 standard that specifies the conveyance of ITU-R System B Teletext in DVB bit streams.

To enable free DVB Teletext captioning, you must install firmware version 3.4 on your X85/X75. If you have an X75, it must also include a 2.0 K FPGA, with a hardware ID parameter of **ID:2 (System Config > Status/Version Info > HD Ver [date, v 0.x, ID:2]**.

Input Detection

Closed Captioning and Teletext data that is embedded in the input stream can be detected by the X85/X75, and read from **Input CC/TT Present**.

Its path is

- **Video Setup > De-embedder > SDI 1 Input** for SDI 1 input (for X75 users, the path is **Video Setup > De-embedder > HD Input**)
- **Video Setup > De-embedder> SDI 2 Input** for SDI 2 input
- **Video Setup > De-embedder > SD (to HD) Input** for SD1/SD2 input that is routed to the SDI 1 and SDI 2 output

Output Embedding

Closed Captioning and Teletext data can be re-embedded into output video stream by setting the **CC/TT Embed** parameter to **On**. Use these paths:

- **Video Setup** > **Embedder** > **SDI 1 Output** for SDI 1 output (for X75 users, the path is **Video Setup** > **Embedder** > **HD Output**)
- **Video Setup** > **Embedder** > **SDI 2 Output** for SDI 2 output
- **Video Setup** > **Embedder** > **SD** (from HD) **Output** for SD1 or SD2 output that is routed from either SDI 1 input or SDI 2 input; or SD 1/SD 2 input that is routed through processing by setting **Video Setup** > **SD Processing** > **ARC/SD-ARC Insert**

Color Correction

The color corrector options for the X75 are separated into two options: one for SD and one for HD (X75OPT-SD-CC and X75OPT-HD-CC, respectively).

For the X85, there is one color corrector option (X85OPT-CC). This option includes an SD color corrector, and two SDI color correctors that operate with input modes of 270 Mb/s, 1.5 Gb/s, and 3.0 Gb/s.

In the X85/X75, the video proc amp/color corrector blocks are located in the input paths of the video signal processing flow, before the video scalar. Their intended use is to provide a means for correcting or compensating for imperfections in the input video signal, before the video signal is converted to another format via up-, down-, or crossconversion. If you use the video proc amp/color corrector controls to alter the output signal directly, distortions may result, caused by the non-linearities of the video scalars. The optional color corrector license keys make changes to the following attributes of an input SD or SDI signal:

- Gain
- Offset
- White slope
- Black Stretch
- Gamma Correction
- Minimum Clip (YCC)
- Maximum Clip (YCC)

These parameters include "lock" options that make it possible for you to adjust all of the options of a particular group in tandem, rather than separately. When a license key is installed, the color corrections can be made by following this path:

Video Setup > SD Processing > Color Corrector

or **Video Setup > SDI Processing > SDI *x* > Color Corrector**

NOTE

In the X85/X75, when you install the SDI color corrector, the proc amp controls (YCC) are part of the color corrector controls (RGB) menu. When the SD color corrector is installed, the proc amp controls (YCC) remain in the same place in the menu structure.

Figure 8-28 on page 218 shows a functional block diagram of the color correction path. Table 8-5 on page 216 provides details on the parameter variables that are available.

X75 Minimum Requirements

In the X75, color correction has minimum hardware and software requirements. Check the following paths to confirm your status:

- **System Config > Status/Version Info > CORE FPGA Ver > May/2006, v1.5** (or higher), **ID:2**
- **System Config > Status/Version Info > HD Ver > May/2007, v0.21** (or higher), **ID:2** (required for HD-SDI color correction)
- **System Config > Status/Version Info > SW Ver > 2.2** (or higher)

Figure 8-23 and Figure 8-24 graphically illustrate the requirements. If your hardware is not capable of supporting the color correction software keys, the original **SD Proc Amp** capabilities will remain.

However, if your X75 *does* meet the minimum requirements, the following SD-SDI and HD-SDI color correction capabilities are available:

SD

- Improved correction capabilities—including RGB support—with the license key (SD Proc Amp functionality does not change when hardware is changed or license key is added.)
- Existing SD Proc Amp capabilities if no license key is added

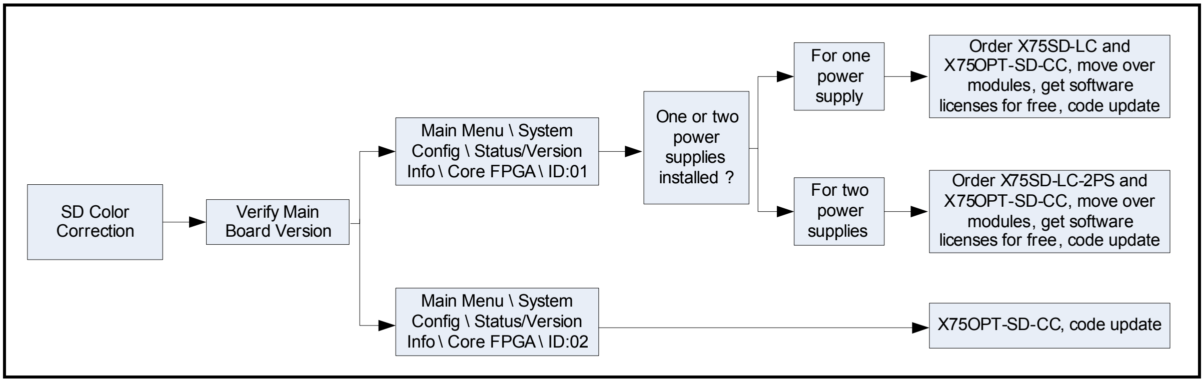


Figure 8-23. SD-SDI Color Correction Requirements

SDI

- Full HD color corrector with license key
- Revised **HD Proc** color correction, based on updated implementation, without license key

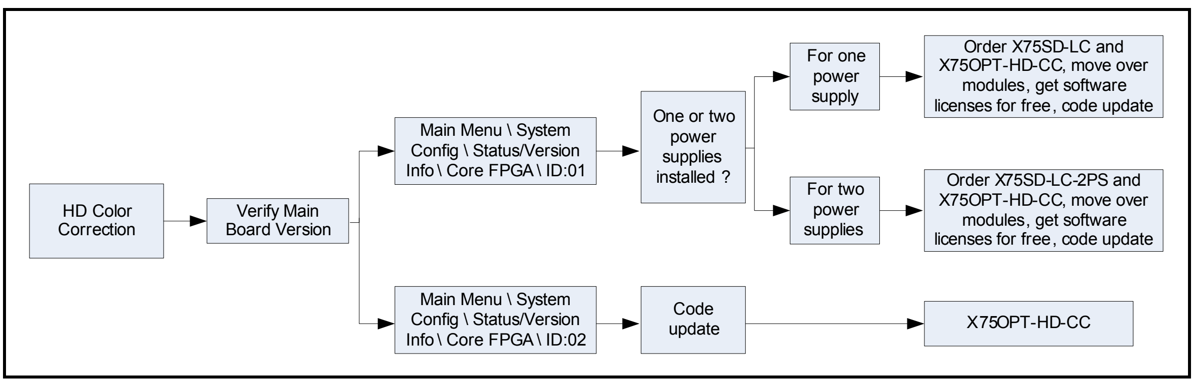


Figure 8-24. HD-SDI Color Correction Requirements

Gain

Gain is displayed in percent, and applied as a factor, where 100% equals a factor of 1.00. The hue rotations are continuous. In other words, they wrap around from -180.0 to +180.0, and vice versa (the default setting is 0).

Offset

YCbCr offsets (displayed in 10 bit counts) are algebraically translated to RGB, by applying the same matrix multiplication that is applied in hardware through the input color space converter. RGB Offsets and Total Offset are added to the results.

White Slope and Black Stretch

The white slope is comprised of **G White Knee**, **B White Knee**, **R White Knee**, and **GBR White Knee Lock**. **Black Stretch** includes **G Black Knee, B Black Knee, R Black Knee**, and **GBR Black Knee Lock**.

Component knees determine the amount of additional gain applied to segments at the ends of the RGB transfer functions in the look-up tables.

The values displayed are a percent of the available correction. A positive white knee increases the slope of the last 15% of RGB values, and decreases the slope of the preceding 15%. A positive black knee parameter will increase the slope of the first 15% of the transfer function by the amount entered and decrease the slope of the next 15%, to return to the unmodified transfer function. Each component knee is added to the total knee (the sum cannot exceed 100%) to produce the correction applied to the respective component.

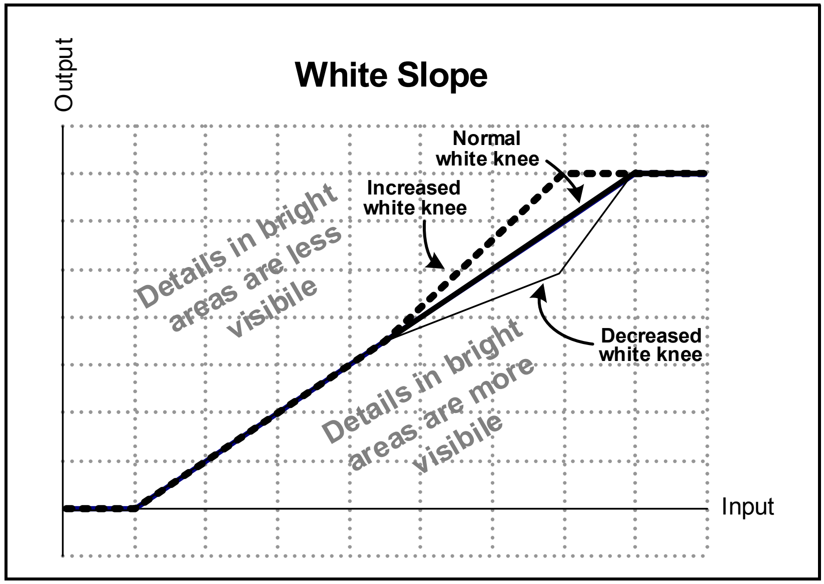


Figure 8-25. Examples of Increased and Decreased White Slope

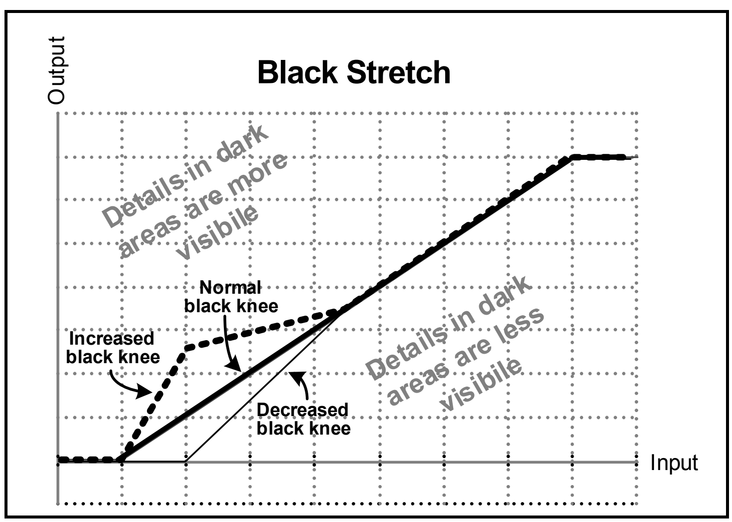


Figure 8-26. Increased and Decreased Black Knees

Gamma Correction

Gamma correction is applied to the RGB as a simple power function, and is applied to each component independently.

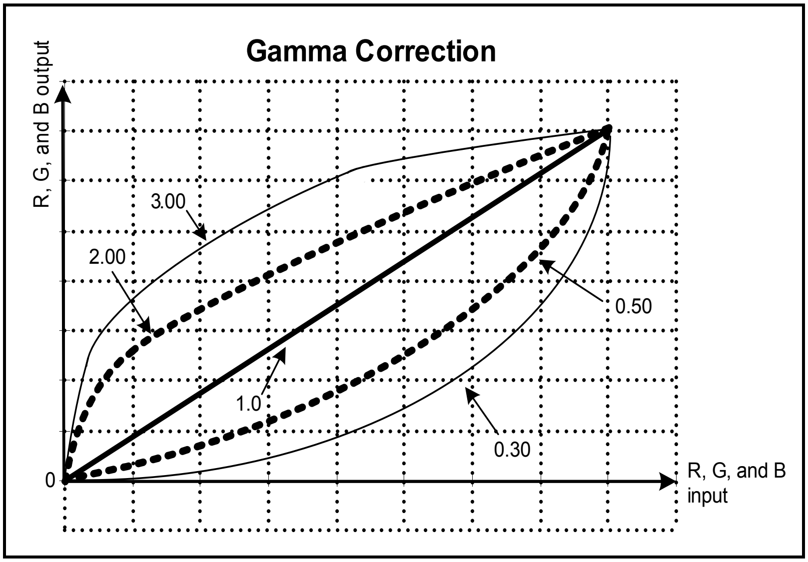


Figure 8-27. Example of Gamma Corrections to R, G, and B

Table 8-5. Color Correction Variables

Parameter Name	Variable Name	Default	Minimum	Maximum	Increments	Notes
Gain [%]	RGBGainLock	0	0	1	1	Gain ranges from 0 to 2, with a default of 1
	YCbCrGainLock	0	0	1	1	
	R_Gain	100	0	200	0.1	
	G_Gain	100	0	200	0.1	
	B_Gain	100	0	200	0.1	
	Y_Gain	100	0	200	0.1	
	Cr_Gain	100	0	200	0.1	
	Cb_Gain	100	0	200	0.1	
Hue Shift [°]	Hue_Shift	0.0	0.0	359.9	0.1	Continuous

Table 8-5. Color Correction Variables

Parameter Name	Variable Name	Default	Minimum	Maximum	Increments	Notes
Offset [10 bit count]	RGBOffsetLock	0	0	1	1	Displayed value is actual 10 bit video value
	YCbCrOffsetLock	0	0	1	1	
	R_Offset	0	-200	+200	1	
	G_Offset	0	-200	+200	1	
	B_Offset	0	-200	+200	1	
	Y_Offset	0	-200	+200	1	
	Cr_Offset	0	-200	+200	1	
	Cb_Offset	0	-200	+200	1	
White Knee [%]	WhiteKneeLock	0	0	1	1	
	R_W_Knee	0	-100	100	0.1	
	G_W_Knee	0	-100	100	0.1	
	B_W_Knee	0	-100	100	0.1	
Black Knee [%]	BlackKneeLock	0	0	1	1	
	R_Blk_Knee	0	-100	100	0.1	
	G_Blk_Knee	0	-100	100	0.1	
	B_Blk_Knee	0	-100	100	0.1	
Gamma	GammaLock	0	0	1	1	
	R_Gamma	1.0	0.30	3.00	0.01	
	G_Gamma	1.0	0.30	3.00	0.01	
	B_Gamma	1.0	0.30	3.00	0.01	
Clip	YCC Minimum	64	64	264	1	
	YCC Maximum	1019	0.33740	1019	1	

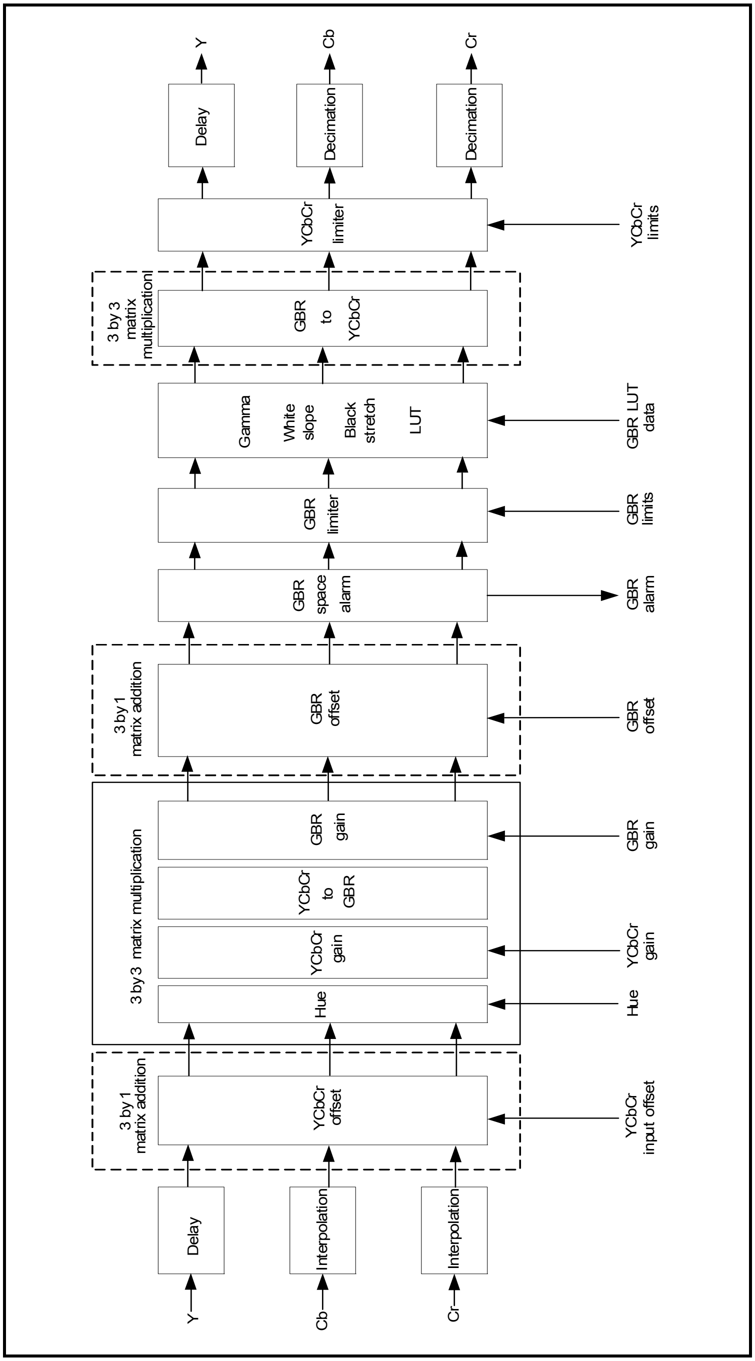


Figure 8-28. Color Correction Functional Block Diagram

Frame Rate Converter (X85 Only)

Linear frame rate conversion involves temporal interpolation or decimation of frames. In other words, the hardware uses the input frames to synthesize more or fewer output frames to create the video output standard you have set. When the output frame rate is higher than the input, the X85 creates extra frames. For lower output frame rates, the X85 subtracts frames. In both cases, all frames going out are different from the ones going in—each output frame is made up of percentages of the input frames that are around it in time. Frame rate conversion offers unparalleled flexibility in converting up, down, and across SD- and HD-SDI. The resultant image may have noticeable artifacts such as judder (stepping motion) and blurring, due to the linear frame rate conversion process.

Table 8-6 lists the different packages available for the frame rate converter option.

Table 8-6. Frame Rate Converter Options

Option	Details
X85OPTSC-SD	SD-to-SD Standards Conversion Software Key License; requires the X85OPTPD-2-M2 program delay feature
X85OPTSC-HD	HD/SD-to-HD/SD Standards Conversion Software Key License; requires the X85OPTPD-2-M2 program delay feature
X85OPTSC-SD-M2	SD-to-SD Standards Conversion Software Key License; includes X85OPT-M2 Memory Module
X85OPTSC-HD-M2	HD/SD-to-HD/SD Standards Conversion Software Key License; includes X85OPT-M2 Memory Module

If you are installing the frame rate converter option in the field and do not already have the X85OPT-M2 Memory Module hardware, follow the installation instructions for the Memory Module found in the *X85/X75 Module Installation Note*.

When you install one of the FRC options, and turn on the **FRC Option Enable** parameter, other functions in the X85 are affected. For example, when you use the FRC, the X85 is reduced to single-path functionality (SDI 2 processing is disabled) and the product no longer operates in the M-Path mode. Instead, the X85 now operates in **All Out Select**; all outputs thus have the same video content. You can use SDI 2 input when the FRC is in operation; however, the SDI 2 input is routed through the frame sync and video processing of the SDI 1 input controls (see Figure 8-29).

Before the frame rate converter is enabled, the **Global Frame Rate** parameter sets both the input and output frame rate. With the FRC enabled, the **Global Frame Rate** controls the output only, and the input is automatically the reverse standard (that is, 25- vs. 30-frame formats).

As the reference input signal is always applied to the **Global Frame Rate**, the reference signal must match the video output of the X85.

The use of the frame rate converter changes the propagation delay for all video standards. Consult the *Edition B X85 Propagation Delay Specifications* table for more information on the delays you will encounter.

Installation Notes

You will need Navigator version 3.3 or later to install the FRC upgrade. After Navigator completes the FRC upgrade for the first time, ensure that you wait 15 minutes for the internal upgrade to take place. (A message on the front panel will tell you when the upgrade is complete.)

With the FRC option in use, the **Program Delay** feature is disabled and Dolby metadata cannot be directly passed to the Dolby encoder. Live I-Wings also cannot be activated when the frame rate converter is in use. However, color background and slide sources for I-Wings are not affected by the use of the FRC option.

After you install—or uninstall—either the X85-OPTSC-SD (SD only) or X85-OPTSC-HD (HD and SD) FRC license key, it is recommended that you recall the factory presets.

NOTE

The FRC function is not a default option. Therefore, if the FRC is already enabled, a factory preset recall will turn the frame converter off.

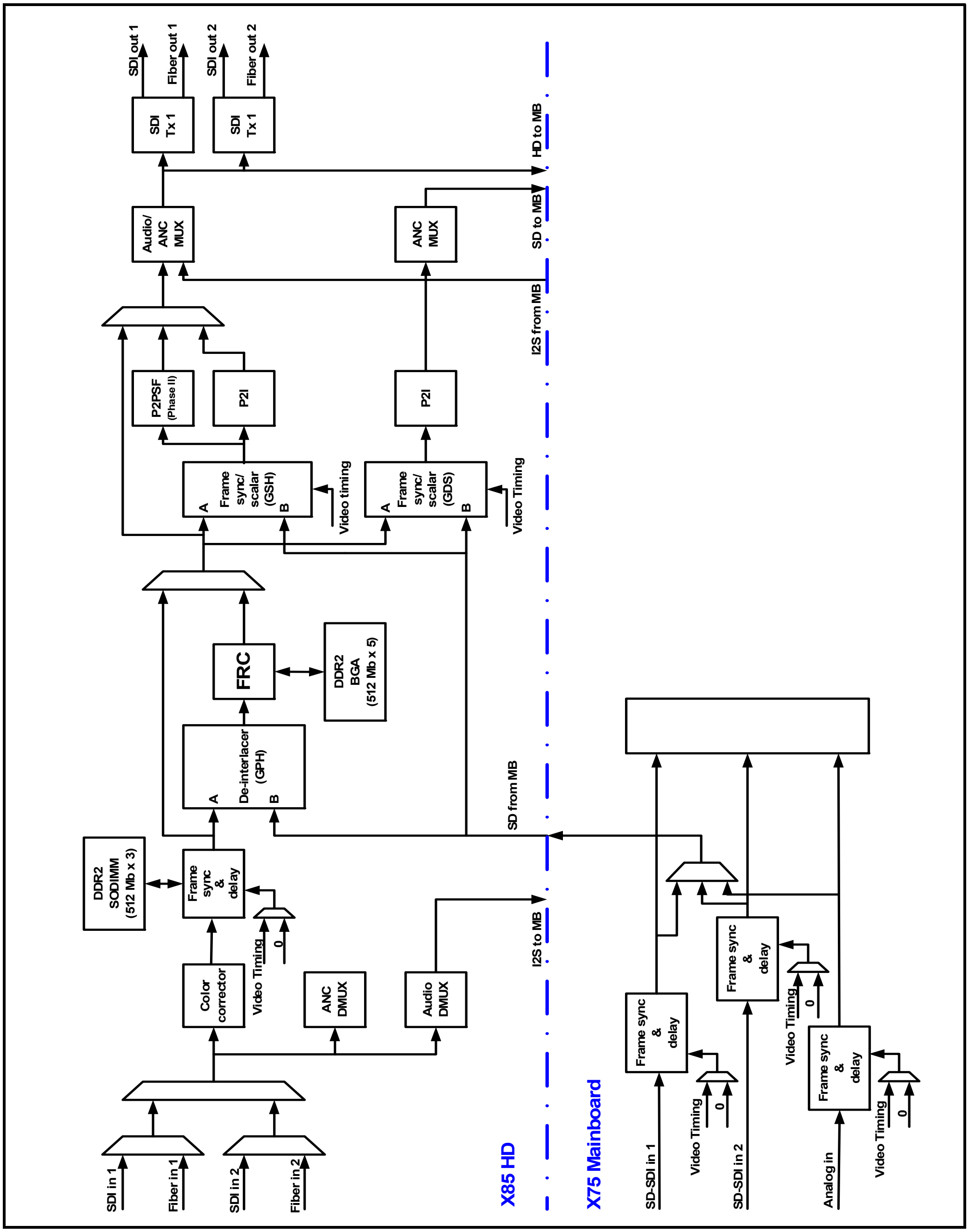


Figure 8-29. X85 Frame Rate Converter Block Diagram

Chapter 9

Audio Configuration

Overview

This chapter describes the audio configuration options that can be changed in the course of normal operation.

The following topics are found in this chapter:

See the *X85/X75 Parameter List* HTML document (available for download from our website or from the included *System and Control Panel Documentation* CD-ROM) for lists of all available menus and parameter options.

General Information

With control panel shortcuts, you can select an input (or multiple inputs) and immediately send it to all audio outputs. Directly press the **Audio In** button to select any one set of audio inputs to be sent out to all audio multiple output sets. The LEDs to the top, right side of this button indicate which input is currently selected. When the selected input signal is absent, the LED flashes.

Available audio input groups include the following:

- Custom
- Analog—4 mono channels of analog audio input
- AES—8 channels
- SD—8, 16, or 32 channels from the SD-SDI de-embedder
- HD—8, 16, or 32 channels from the HD-SDI de-embedder
- Dolby—10 channels from the internal Dolby decoder
- DTS Neural Surround and Loudness Control processing—maximum of 8 channels input and 8 channels output
- Test Tones (V2A)

Depending upon which input you have selected, the X75 unit automatically and logically maps all output channels. When you select two or more audio input groups, the **Audio In Src Select** parameter is automatically set to the **Custom** setting, and this control is available from the **Audio Setup > Routing** submenu.

To switch between mono and stereo audio processing control, press the **Ctrl** and **Mo/St** buttons simultaneously. When mono control is active, each button controls an individual gain. When stereo control is active, the top and bottom front panel buttons work together (are "married") so that either button will adjust the gain in stereo pairs.

NOTE

The optional X75OPT-AS-8/16/32 module is required for synchronizing, delaying and processing mono audio for SD-SDI and HD-SDI inputs.

Selecting an Audio Source

Press the **Audio In** button to select any *one* set of audio inputs to be sent out to *all* audio multiple output sets. The LEDs to the top, right side of this button indicate which input is currently selected. This table shows how the signals are routed internally and mapped to audio outputs.

Table 9-1. Audio Source Groupings

Default Output Mapping	**Input Audio Source Groups**					
	Analog	**AES**	**SDI (X85)**	**SD-SDI X (X75)**	**HD-SDI X (X75)**	**Dolby**
AA_Out1	AA 1	AES 1a	SDIX 1	SDX 1	HDX 1	Dolby 1
AA_Out2	AA 2	AES 1b	SDIX 2	SDX 2	HDX 2	Dolby 2
AA_Out3	AA 3	AES 2a	SDIX 3	SDX 3	HDX 1	Dolby 3
AA_Out4	AA 4	AES 2b	SDIX 4	SDX 4	HDX 2	Dolby 4
AES1_OutA	AA 1	AES 1a	SDIX 1	SDX 1	HDX 1	Dolby 1
AES1_OutB	AA 2	AES 1b	SDIX 2	SDX 2	HDX 2	Dolby 2
AES2_OutA	AA 3	AES 2a	SDIX 3	SDX 3	HDX 3	Dolby 3
AES2_OutB	AA 4	AES 2b	SDIX 4	SDX 4	HDX 4	Dolby 4
AES3_OutA		AES 3a	SDIX 5	SDX 5	HDX 5	Dolby 5
AES3_OutB		AES 3b	SDIX 6	SDX 6	HDX 6	Dolby 6
AES4_OutA		AES 4a	SDIX 7	SDX 7	HDX 7	Dolby 7
AES4_OutB		AES 4b	SDIX 8	SDX 8	HDX 8	Dolby 8
AES5_OutA		AES 5a	SDIX 9	SDX 9	HDX 9	DolbyAuxL
AES5_OutB		AES 5b	SDIX 10	SDX 10	HDX 10	DolbyAuxR
SD1/HD1_OutA	AA 1	AES 1a	SDIX 1	SDX 1	HDX 1	Dolby 1
SD1/HD1_OutB	AA 2	AES 1b	SDIX 2	SDX 2	HDX 2	Dolby 2
SD2/HD2_OutA	AA 3	AES 2a	SDIX 3	SDX 3	HDX 3	Dolby 3
SD2/HD2_OutB	AA 4	AES 2b	SDIX 4	SDX 4	HDX 4	Dolby 4
SD3/HD3_OutA		AES 3a	SDIX 5	SDX 5	HDX 5	Dolby 5

Table 9-1. Audio Source Groupings *(Continued)*

Default Output Mapping	**Input Audio Source Groups**					
	Analog	**AES**	**SDI (X85)**	**SD-SDI X (X75)**	**HD-SDI X (X75)**	**Dolby**
SD3/HD3_OutB		AES 3b	SDIX 6	SDX 6	HDX 6	Dolby 6
SD4/HD4_OutA		AES 4a	SDIX 7	SDX 7	HDX 7	Dolby 7
SD4/HD4_OutB		AES 4b	SDIX 8	SDX 8	HDX 8	Dolby 8
SD5/HD5_OutA		AES 5a	SDIX 9	SDX 9	HDX 9	
SD5/HD5_OutB		AES 5b	SDIX 10	SDX 10	HDX 10	
SD6/HD6_OutA			SDIX 11	SDX 11	HDX 11	
SD6/HD6_OutB			SDIX 12	SDX 12	HDX 12	
SD7/HD7_OutA			SDIX 13	SDX 13	HDX 13	
SD7/HD7_OutB			SDIX 14	SDX 14	HDX 14	
SD8/HD8_OutA			SDIX 15	SDX 15	HDX 15	
SD8/HD8_OutB			SDIX 16	SDX 16	HDX 16	

Adjusting Audio Levels

When an audio source group is selected and sent to all outputs, press the **Ctrl** and **A. Proc** buttons to quickly access the audio level controls of the selected audio input. The selected audio input channels' gain controls are mapped to the numbered buttons on the control panel accordingly. The mapped buttons illuminate during audio proc control. The **Audio Proc** LEDs on the lower, right corner of the front panel indicate which processing block is currently selected.

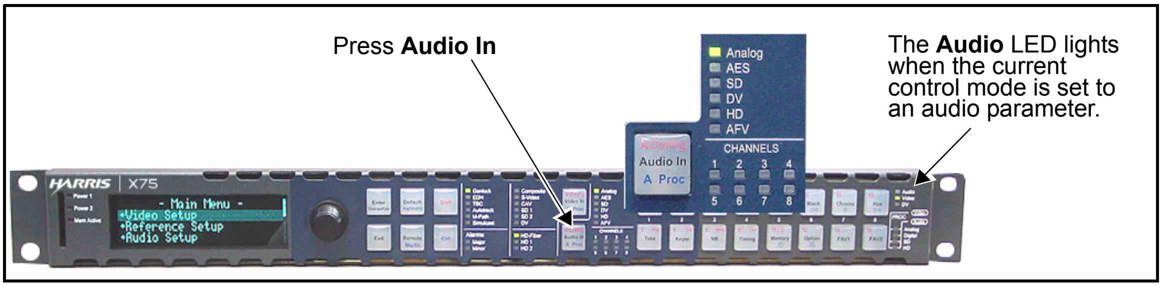


Figure 9-1. Audio Input Control Area (X75 Shown)

Audio LED and Buttons Map

When you press the **Audio In** or **Ctrl + A Proc** button on a local or remote control panel, or if you make audio input selections via your Web browser software or other control application, certain parameters and audio proc amp buttons get mapped, and various **Channel** LEDs and **Audio I/P** LEDs will light according to the selected input configuration. The following tables describe the LEDs and buttons that are assigned to selected input sources.

Tables 10-1 through 10-6 in "Chapter 10: Special Function Buttons" describe the various channels, LEDS, gain controls, and control panel buttons that are affected/activated by the selection of certain analog, AES, SD-SDI, and/or HD-SDI demuxed audio inputs. Use the **Ctrl** + **A Proc** buttons to switch between the audio input types.

NOTE

For audio input configuration, an optional X75OPT-AS-8/16/32 module must be installed.

Selecting an Audio Input

Directly press the **Audio In** button to select any one input group to be sent out to all audio outputs. Alternatively, open the **Audio Setup** menu and navigate to the **Routing** submenu. From here you can select and configure your audio inputs.

After configuring your audio inputs, the following LEDs will light (see Figure 9-2 on page 229 for their locations):

- The **Audio** LEDs on the far right side of the front panel indicate the current mode of operation.
- The **Audio Proc** LED on the far right side of the front panel indicates the current processing audio group.
- The **Audio Input** LEDs to the top, right of the **Audio In** button indicate which input group is currently selected.

- The **Audio Channel** LEDs immediately to the right of the button indicate which audio channels are mapped and internally routed to the SRC channels.

  See “Audio Proc Amp” on page 217 for information on LED and channel mappings on a frame-mounted local control panel or X75-RCP remote control panel.

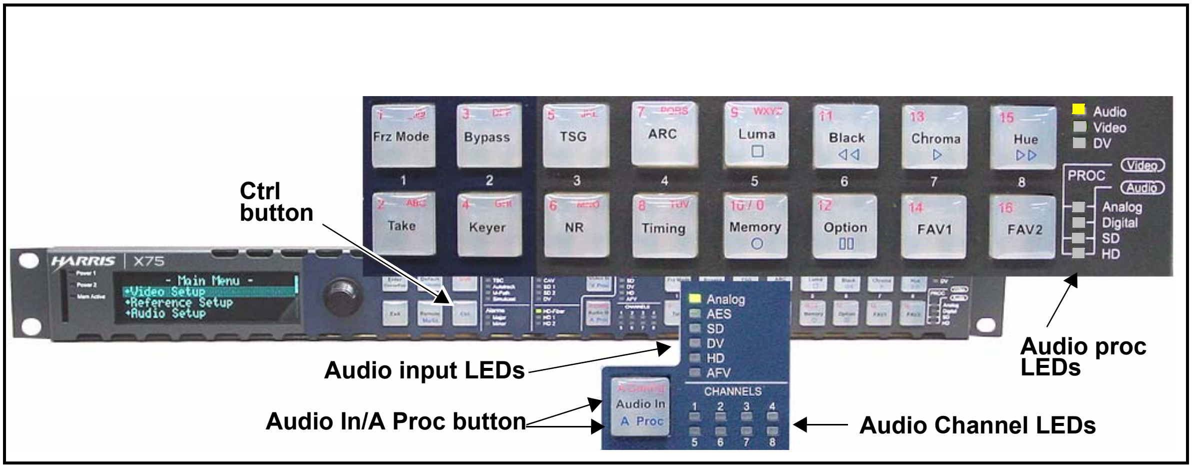


Figure 9-2. Location of Audio LEDs (X75 Shown)

Accessing Audio Level Controls

Press the **Ctrl** and **A Proc** buttons together to quickly access the audio level controls of a selected audio input. Along with LEDs, the selected audio input channel’s gain controls will be mapped to specific numbered buttons on the right side of the front panel. These buttons will light during audio processing and configuration.

See “Audio Proc Amp” on page 217 for information on LED and channel mappings on a frame-mounted local control panel or X75-RCP remote control panel.

Tracking and Delaying Audio

Each audio sample rate converter (SRC) can be configured to automatically track the processing delay of one of the video outputs. To apply the internal audio tracking feature, follow: **Audio Setup > Global Audio Config > I/O Delay Config**. Select one of the four or eight **I/O Delay SRC**s, and then select the accompanying video signal to track with that audio SRC.

AFV (Audio Follow Video)

In the Audio Follow Video mode, (**Audio Setup** > **Routing**), each of the selectable video inputs has an audio input selection linked to it. With this feature enabled, the audio input selection for the channel automatically changes when the video input is changed.

You can enable or disable the AFV mode through **Audio Setup** > **Routing** > **SRC1 -Audio Follows Vid** to **SRC16-Audio Follows Vid.**

The **<channel> -AFV- <input>** parameters specify the audio input channel ("**<channel>**") to be automatically switched when the **SD Out Sel** parameter is switched to a specified input ("**<input>**"). For example, the **Ch1-AFV-SD 1** parameter specifies the audio input for **SRC Channel 1** will be automatically switched when the **SD Out Sel** parameter changes to **SD1**.

NOTE

The AFV mode currently functions on the SD 1 output.

When AFV mode is enabled for any single SRC channel, the AFV LED on the front panel of the unit will be lit.

You can override AFV mode by manually selecting a different audio input. This will not, however, turn AFV mode off—the next time the video input selection is changed, the audio will again follow it. AFV mode can only be disabled through the audio menus.

Figure 9-3 on page 231 shows the default AFV audio and video assignments on the X75; Figure 9-8 on page 237 shows the default AFV audio and video assignments on the X85. The drawings illustrate the linked audio channels in AFV mode when the video is switched from the composite input to SD 1 video. When the AFV is enabled for all SRC channels, the composite input video selection also routes analog input channels 1 and 2 to SRC channel 1, and analog input channels 3 and 4 to SRC channel 2. When SD 1 input video is selected, all four groups of de-multiplexed audio channels are routed through eight SRC channels.

You can assign different audio inputs to each SRC channel, as well as enable and disable the AFV function for each video input to create a complex routing.

Video Inputs

Toggles between inputs

SRC Input Channels

	Cmpst	S-Vid	CAV	SD1	SD2	HDF	HD1	HD2
CH1	AA1/2	AA 1/2	AES1a/1b	SDX1/2	SDX1/2	HDX1/2	HDX1/2	HDX1/2
CH2	AA3/4	AA 3/4	AES2a/2b	SDX3/4	SDX3/4	HDX3/4	HDX3/4	HDX3/4
CH3	AA1/2	AA 1/2	AES3a/3b	SDX5/6	SDX5/6	HDX5/6	HDX5/6	HDX5/6
CH4	AA3/4	AA 3/4	AES4a/4b	SDX7/8	SDX7/8	HDX7/8	HDX7/8	HDX7/8
CH5	AA1/2	AA 1/2	AES5a/5b	SDX9/10	SDX9/10	HDX9/10	HDX9/10	HDX9/10
CH6	AA3/4	AA 3/4	AES1a/1b	SDX11/12	SDX11/12	HDX11/12	HDX11/12	HDX11/12
CH7	AA1/2	AA 1/2	AES2a/2b	SDX13/14	SDX13/14	HDX13/14	HDX13/14	HDX13/14
CH8	AA3/4	AA 3/4	AES3a/3b	SDX15/16	SDX15/16	HDX15/16	HDX15/16	HDX15/16

Figure 9-3. X75 Default AFV Channel Assignment

Video Inputs

Toggles between inputs

SRC Input Channels

	Cmpst	S-Vid	CAV	SD 1	SD 2	FIBER 1	FIBER 2	SDI 1	SDI 2
CH1	AA 1/2	AA 1/2	AES 1a/1b	SDX 1/2	SDX 1/2	SDIX 1/2	SDIX 1/2	SDIX 1/2	SDIX 1/2
CH2	AA 3/4	AA 3/4	AES 2a/2b	SDX 3/4	SDX 3/4	SDIX 3/4	SDIX 3/4	SDIX 3/4	SDIX 3/4
CH3	AA 1/2	AA 1/2	AES 3a/3b	SDX 5/6	SDX 5/6	SDIX 5/6	SDIX 5/6	SDIX 5/6	SDIX 5/6
CH4	AA 3/4	AA 3/4	AES 4a/4b	SDX 7/8	SDX 7/8	SDIX 7/8	SDIX 7/8	SDIX 7/8	SDIX 7/8
CH5	AA 1/2	AA 1/2	AES 5a/5b	SDX 9/10	SDX 9/10	SDIX 9/10	SDIX 9/10	SDIX 9/10	SDIX 9/10
CH6	AA 3/4	AA 3/4	AES 1a/1b	SDX 11/12	SDX 11/12	SDIX 11/12	SDIX 11/12	SDIX 11/12	SDIX 11/12
CH7	AA 1/2	AA 1/2	AES 2a/2b	SDX 13/14	SDX 13/14	SDIX 13/14	SDIX 13/14	SDIX 13/14	SDIX 13/14
CH8	AA 3/4	AA 3/4	AES 3a/3b	SDX 15/16	SDX 15/16	SDIX 15/16	SDIX 15/16	SDIX 15/16	SDIX 15/16

Figure 9-4. X85 Default AFV Channel Assignment

Advanced Audio Inputs and Outputs Selection

For custom applications, the X85/X75 unit provides full input and output routing control. You can select multiple audio input sources simultaneously and route them internally to meet your application requirements (see Figure 9-5 on page 234 to Figure 9-10 on page 239). Each SRC can be assigned to any stereo input sources. Mono-based audio outputs can select any SRC outputs, including the summation, tones, and mutes. More than one audio input LED will light when multiple audio input sources are selected (for example, **Analog** and **AES**).

To make changes to these audio input and outputs, follow this path: **Audio Setup > Routing > Input** or **Output.**

Audio Embedding and De-embedding

The X85 has one embedder for SDI 1 and one for SDI 2. Each is capable of embedding eight channel pairs of audio. You can set the embedder channel mapping at **Audio Setup > Routing > Output > SDI 1 Embedded Audio** or **SDI 2 Embedded Audio**.

Similarly, the X85 has one de-embedder for SDI 1 and one for SDI 2, each capable of de-embedding eight channel paris of audio, for a combined total of sixteen channel pairs. You can select the eight channel pairs for processing at: **Audio Setup > Input Setup >Demuxed Audio > SDI *x* Channel**.

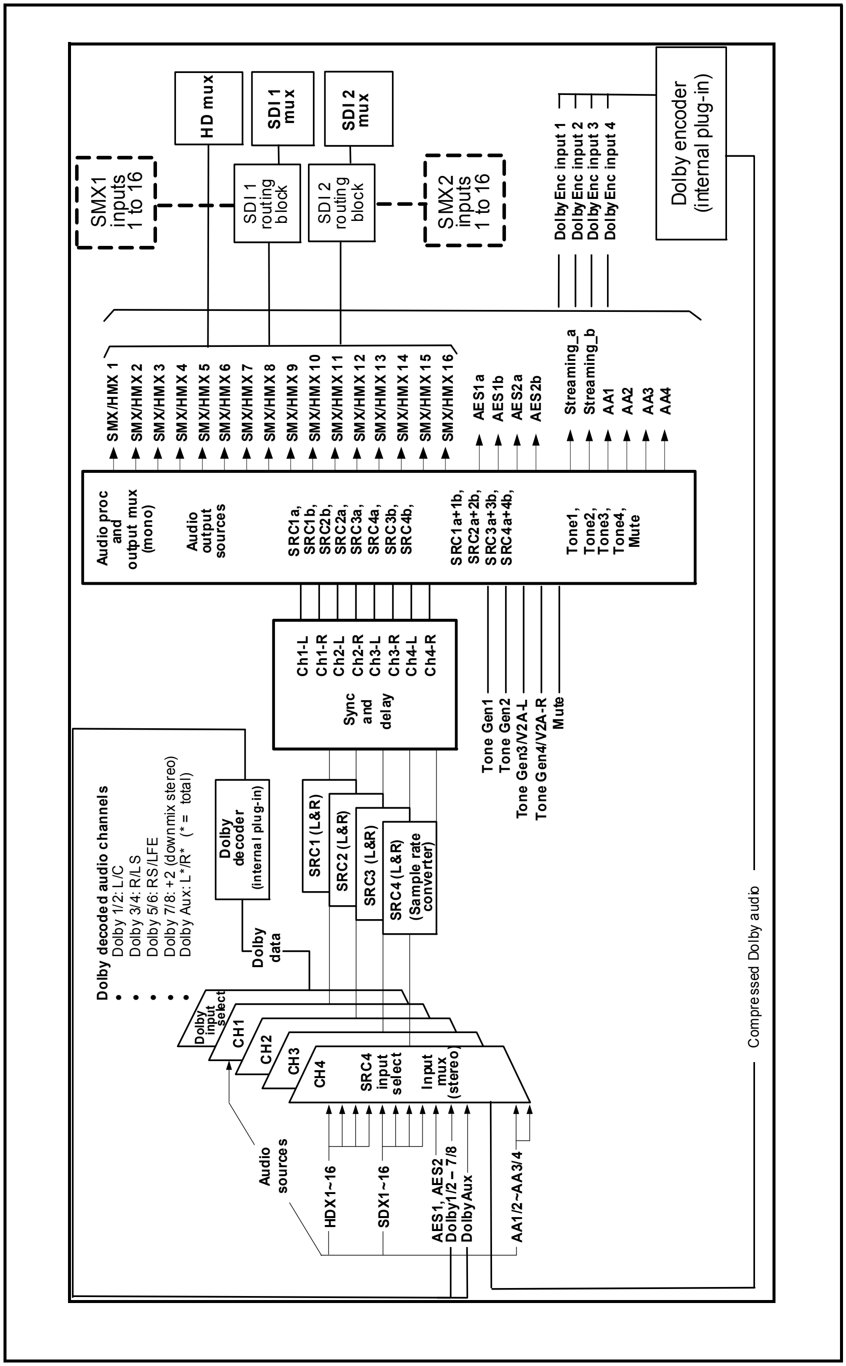


Figure 9-5. X75 Advanced Audio Signal Routing (8-Channel)

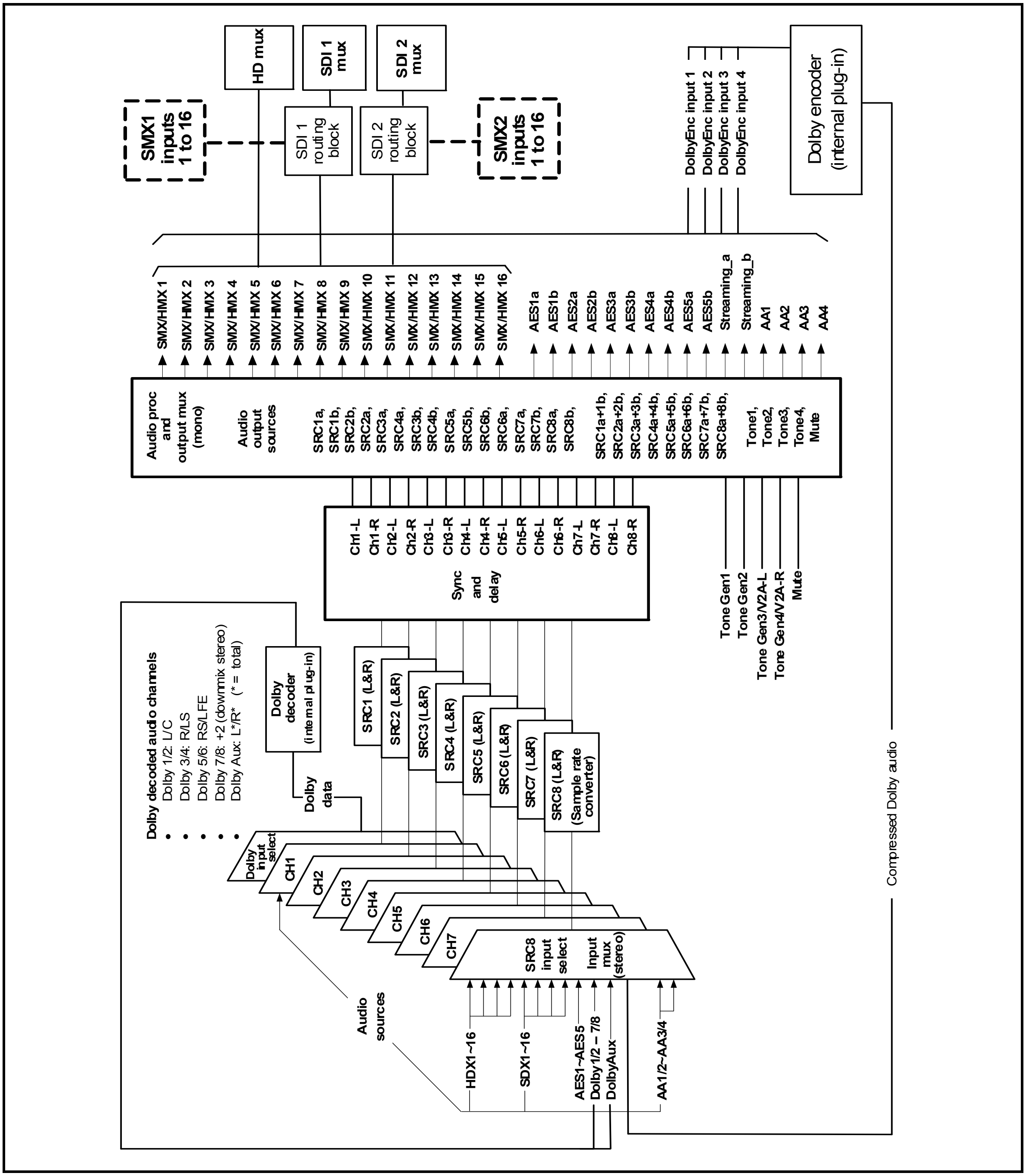


Figure 9-6. X75 Advanced Audio Signal Routing (16-Channel)

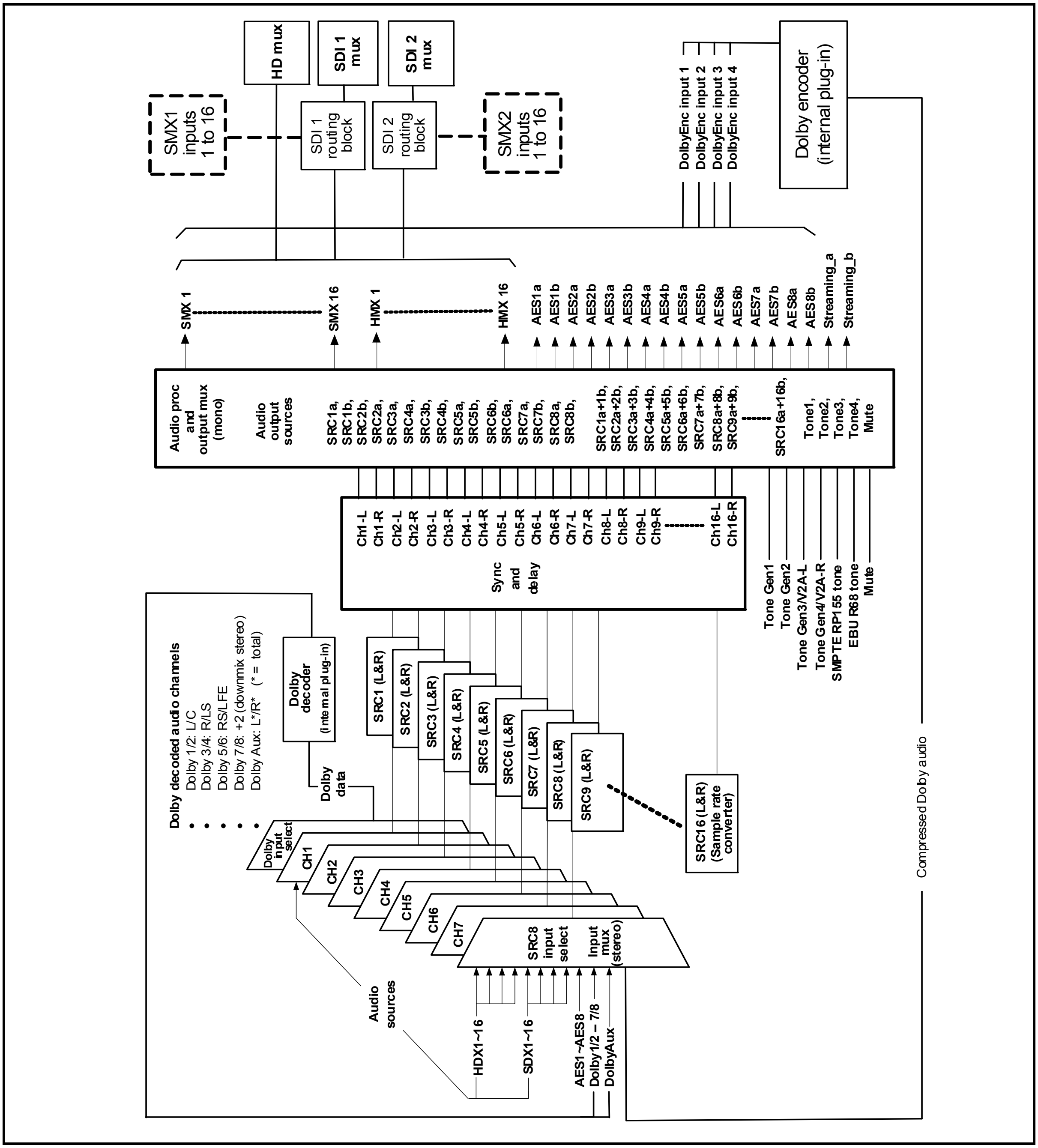


Figure 9-7. X75 Advanced Audio Signal Routing (32-Channel)

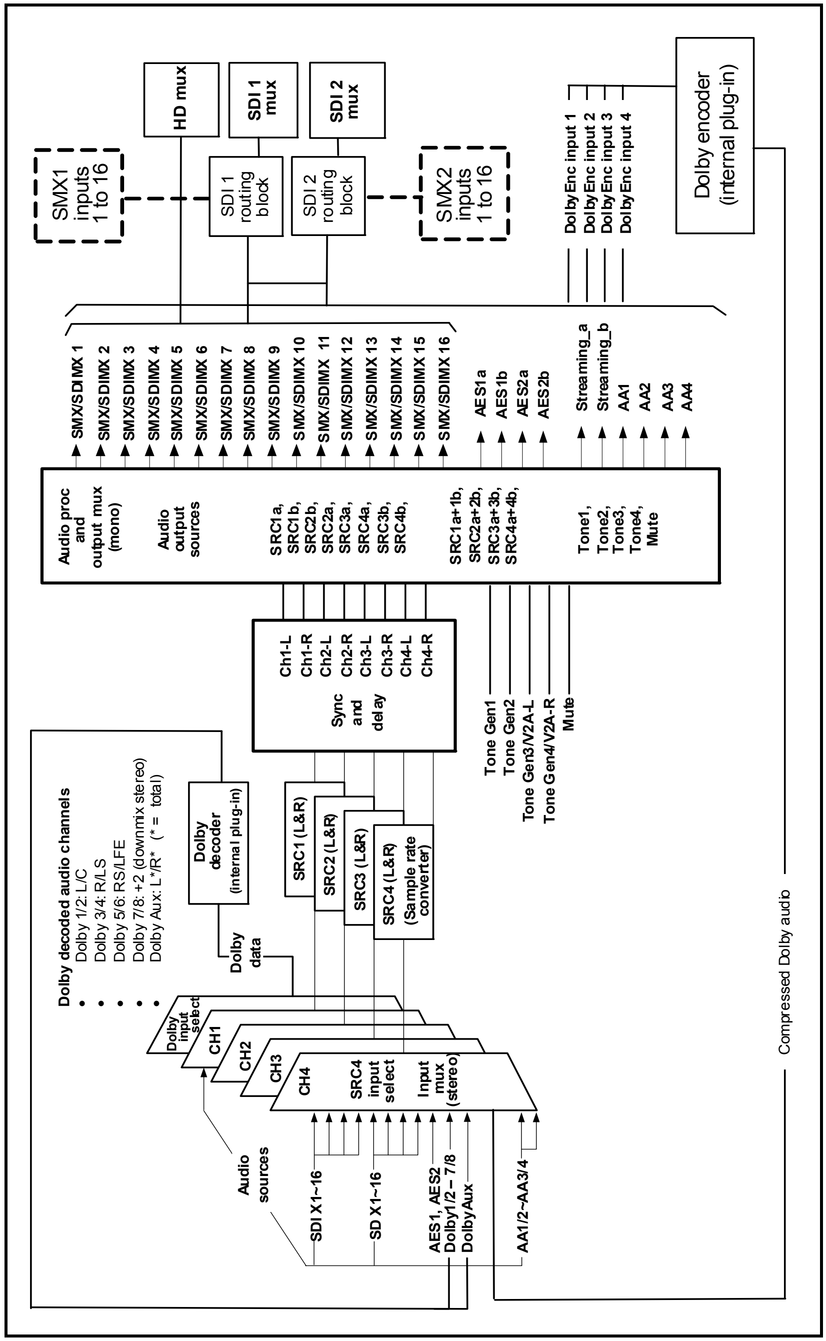


Figure 9-8. X85 Advanced Audio Signal Routing (8-Channel)

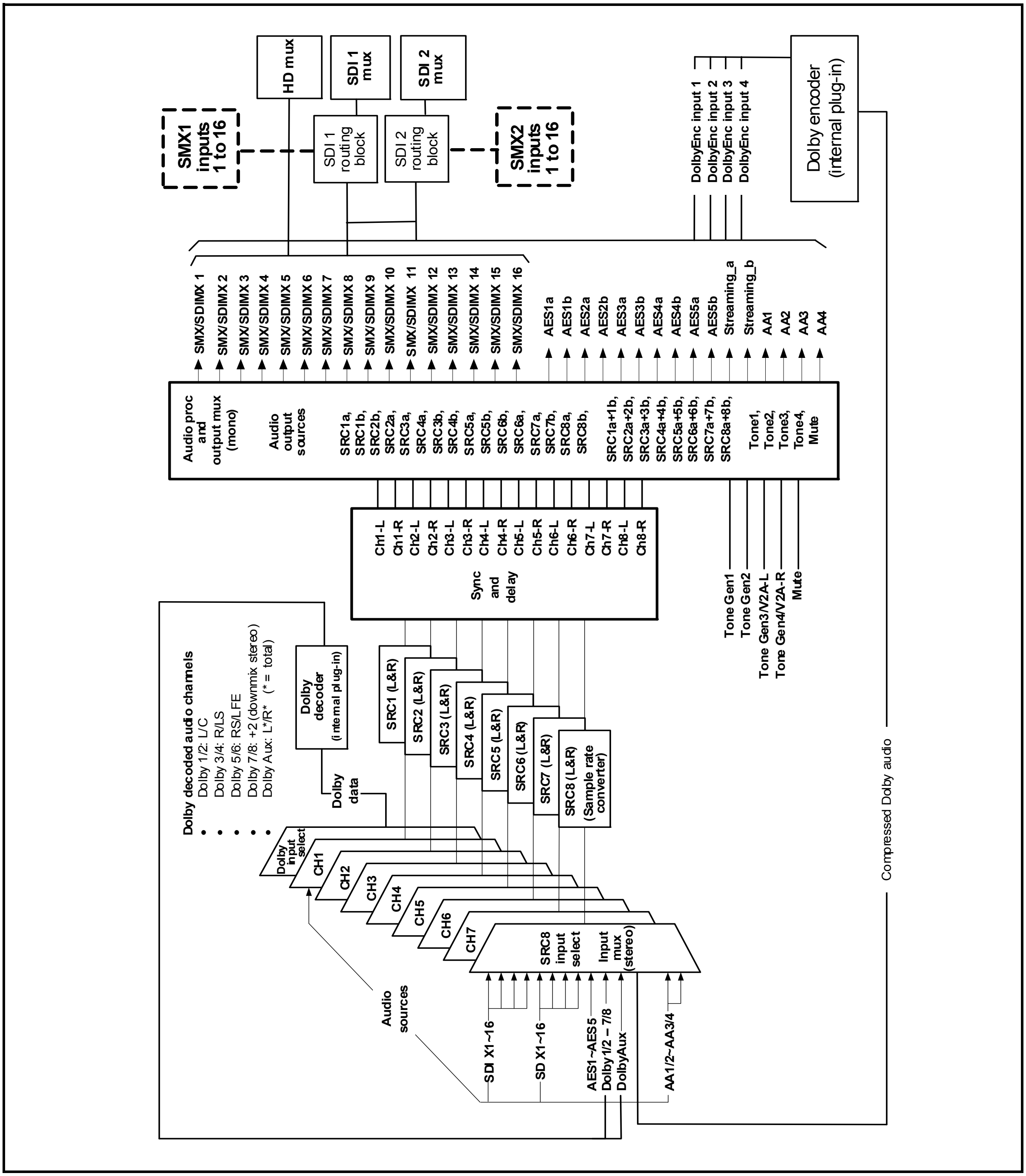


Figure 9-9. X85 Advanced Audio Signal Routing (16-Channel)

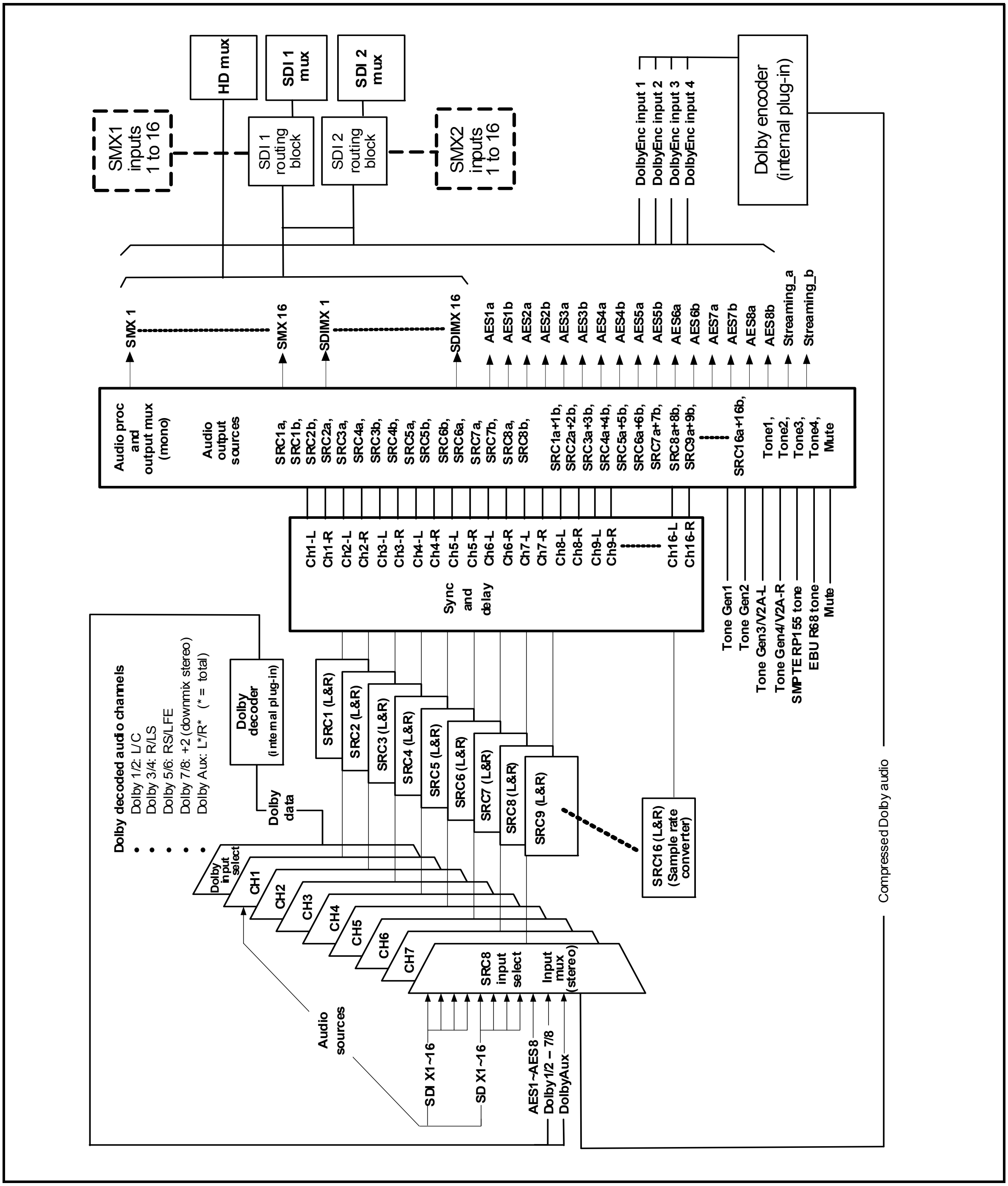


Figure 9-10. X85 Advanced Audio Signal Routing (32-Channel)

Dolby E Embedding

The X85 and X75 provide three Dolby encoding and decoding options (information about installing these Dolby options begins on page 372; descriptions of the various options begin on page 246).

When the X85/X75 receives video with embedded audio, the audio is de-embedded for processing. Video is routed to a frame synchronizer, while the audio is sent to an audio synchronizer. At this point, the video and PCM audio content are aligned and synchronous with respect to each other, and the PCM audio can be encoded into a Dolby E format. The X85/X75 may internally encode the Dolby E, or a separate external encoder may be used. If the video frame rate is less than or equal to thirty frames per second, the Dolby E encoder produces a delay of one video frame. If the video frame rate exceeds 30 frames per second, the Dolby E frame rate should be adjusted to one half the video frame rate (currently, Dolby E encoding does not exceed 30 fps). Thus the encoder produces a two frame video delay in the audio stream.

The X85/X75 then allows for an additional user delay to be added to the Dolby E stream if required.

When Dolby E is embedded into video, it must be synchronously locked to the output video. When the packet header is detected, it is delayed to allow proper alignment of the packet with respect to the video stream. This variable delay will range from one half to three halves of a video frame, depending on the alignment of the Dolby E stream with respect to the output video. This operation takes place regardless of whether an internal or external Dolby E encoder is used.

The Dolby Packet header can be embedded into different user-defined lines for different output standards.

The total delay in the audio stream relative to the video stream will be the sum of the Dolby E encoder delay, plus one frame delay for the audio embedder. For video frame rates supported by Dolby E, this delay will be two video frames. For a rate greater than that supported by Dolby E, this delay will be three video frames.

For video frame rates that are greater than that supported by Dolby E (720p at 50 Hz for example), with the application of a reference signal at one half of the output video rate (625 genlock 25 Hz signal for example), a one video frame delay may be applied with the adjustable user delay parameter in the X85/X75. This makes it possible for the output video with embedded Dolby E audio to be aligned with the applied reference signal.

To add these user delays, follow these paths:

X85

- **Video Setup > SDI Processing > SDI 1** or **SDI 2> SDI 1** or **SDI 2 Input Frame Del**
  (for SD and 1.5G/3G HD-SDI)
- **Video Setup > SD Processing > Strobe/Delay > Strobe/Delay Insert**
  and
  Video Setup > SD Processing > Fixed Frame Del 1 (for SD)

X75

- **Video Setup > SDI Processing > HD > HD Input Frame Delay**
  (for 1.5G HD-SDI)
- **Video Setup > SD Processing > Strobe/Delay > Strobe/Delay Insert**
  and
  Video Setup > SD Processing > Fixed Frame Del 1 (for SD)

See the X85 and X75 *Propagation Delay Tables* found on the *X85/X75 System and Control Panel Documentation CD-ROM* for video propagation delay specifications.

Audio Delays in Dolby E and AC-3

When using Dolby E audio embedding on the X85/X75, audio content delay will vary, depending upon the alignment of the incoming Dolby E-encoded AES audio. When the Dolby E packet header leads the video switching line by *less than* 10 ms, it is delayed by one video frame *plus* the delay required to place the packet header at the appropriate location in the video. However, when the Dolby E packet header leads the video switching line by *more than* 10 ms, it is delayed only by the amount required to place the packet header at the appropriate location in the video (in other words, no video frame delay is added).

Therefore, when the Dolby E signal comes from an external source, the embedded audio content delay can vary from a minimum of one-third of a frame, to one and two-thirds of a frame.

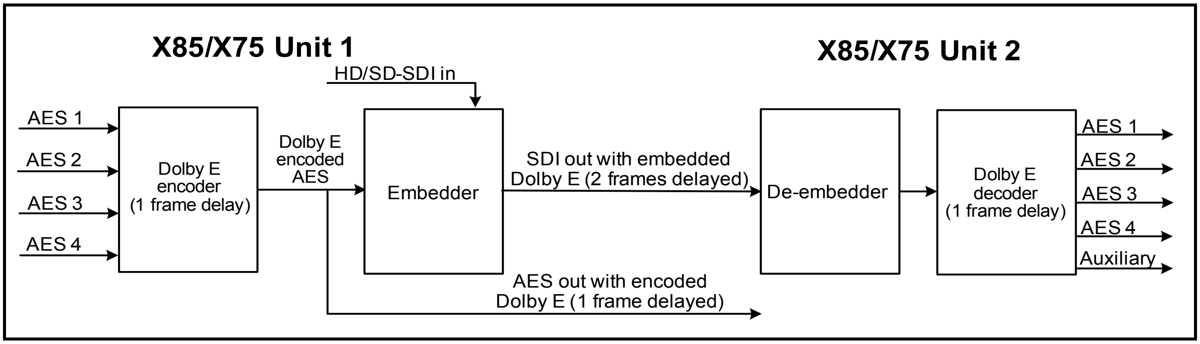


Figure 9-11. Audio Delay in Dolby E

Using the X75OPT-DOLBY-2 internal encoder, a two-frame audio content delay is added to the HD- or SD-SDI signal (one frame for the encoding process and one frame for the embedding process). If you use the X85/X75's Dolby E-encoded AES output instead of the Dolby E-encoded SDI output, there is a one frame delay.

Dolby AC-3 and Dolby E add one frame of delay in the decoding mode.

To configure the automatic alignment of embedded Dolby bit streams, use the parameters in the following locations:

X85

- **Audio Setup > Global Audio Config > Dolby E Config > SD Dolby E Start Line**
- **Audio Setup > Global Audio Config > Dolby E Config > SDI 1 Dolby E Start Line**
- **Audio Setup > Global Audio Config > Dolby E Config > SDI 2 Dolby E Start Line**

X75

- **Audio Setup > Global Audio Config > Dolby E Config > SD Dolby E Start Line**
- **Audio Setup > Global Audio Config > Dolby E Config > HD Dolby E Start Line**

You can set the desired Dolby line alignment for each output. However, if an audio channel is shared among multiple outputs, the alignment precedence is based on the output priority order defined in the path **Audio Setup > Global Audio Config > Dolby E Config > Alignment Priority.**

The default alignment order is:

1. **SDI 1** (X85)/**HD** (X75), **SDI 2,** and then **SD.**

NOTE

X85/X75 Dolby modules do not currently support frame rates of more than 30 frames per second.

For more information about Dolby applications, see the *X85-3G/X85HD/X75SD Dolby and Audio Metadata Applications User Manual*.

Backup Dolby Input for 32-Channel Modules

The X85/X75 provides automatic changeover of a Dolby input signal when 32-channel audio is installed. To enable this feature, select the secondary (backup) Dolby input source in **Audio Setup** > **Routing** > **Input** > **Dolby Second Input**.

If the primary Dolby source is lost, the X85/X75 will automatically switch to the secondary Dolby source.

Audio Metadata

The audio metadata feature de-embeds audio metadata from various sources and re-embeds the audio metadata into multiple outputs. Use the **Ameta Source** option (**Audio Setup > Audio Metadata > Output Setup**) to select the source. The **Ameta Present** parameter indicates when the metadata is detected.

The audio metadata source may be one of the following:

- Metadata embedded in SD and HD (Methods A and B)
- Output of the Dolby decoder
- Input of the serial port
- Metadata generator

The audio metadata may be inserted into the following outputs:

- SD 1, SD 2, HD 1, and HD 2 output video (Methods A and B) on the X75
- SD 1 and SD 2, and SDI 1 and SDI 2 at 270 Mb/s (Methods A and B) on the X85
- Serial port
- Dolby encoder

Once the source is selected, it applies to all of the outputs.

NOTE

When you install the X75OPT-DOLBY-1 decoder on either the X75 or the X85, the audio metadata serial output can be enabled only when the audio metadata source is the Dolby decoder. To generate metadata via serial port from the other sources, you must remove the decoder module.

DTS Neural Audio Delays

If you enable a DTS Neural option, select **None** at **Audio Setup > Global Audio Config > I/O Delay Config**. You will then need to adjust the video frame delay to compensate, as shown:

X85

- **Video Setup > SDI Processing > SDI 1** or **SDI 2> SDI 1** or **SDI 2 Input Frame Del**
  (for SD and 1.5G/3G HD-SDI)
- **Video Setup > SD Processing > Strobe/Delay > Strobe/Delay Insert**
  and
  Video Setup > SD Processing > Fixed Frame Del 1 (for SD)

X75

- **Video Setup > SDI Processing > HD > HD Input Frame Delay**
  (for 1.5G HD-SDI)
- **Video Setup > SD Processing > Strobe/Delay > Strobe/Delay Insert**
  and
  Video Setup > SD Processing > Fixed Frame Del 1 (for SD)

See the X85/X75 parameter list included in the *System and Control Documentation* CD-ROM for useful information about the audio metadata parameters used in the X85/X75. For general information about the use of audio metadata in professional video applications, visit the Dolby Web site at www.dolby.com.

Specific Dolby applications are described in the *X85-3G/X85HD/X75SD Dolby and Audio Metadata Applications User Manual*.

Table 9-2. DTS Neural Propagation Delays

DTS Neural Option	Delay (ms)
X75OPT-DM	19
X75OPT-DM-LC	72
X75OPT-LC	67
X75OPT-LC-6+2	67
X75OPT-LC-8	67
X75OPT-LC+DM	67
X75OPT-MM	62
X75OPT-MM-LC	115
X75OPT-UM	62
X75OPT-UM-LC	115

Dolby and DTS Neural Audio Licenses

The X85/X75 offers a wide variety of Dolby and DTS Neural audio processing options, either as separate licenses, or in different combinations. These options make it possible to offer advanced audio processing for high-definition and surround sound programming using 5.1 and stereo sources.

To install one of these audio options, your X85/X75 must have an X75OPT-AS-32 audio module. Ensure that you refresh CCS Navigator whenever you change a Dolby or DTS Neural license key.

NOTE

Each X85/X75 can accommodate either a Dolby decoder and a DTS Neural module, or a Dolby decoder and a Dolby encoder. A DTS Neural module and a Dolby encoder cannot be used at the same time.

Table 9-3. DTS Neural and Dolby License Key/Hardware Packages

Part Number	Capability
X75OPT-DOLBY-1	Dolby E and Digital (AC3) integrated decompression for audio metadata output
X75OPT-DOLBY-2	Dolby E integrated compression for audio metadata input
X75OPT-DOLBY-3	Dolby AC-3 integrated compression for audio metadata input
X75OPT-DM	DTS Neural Surround™ DownMix DTV 5.1 transport solution
X75OPT-DM-LC	DTS Neural Surround™ DownMix DTV 5.1 transport solution with DTS Neural Loudness Control
X75OPT-LC	DTS Neural Loudness Control for 2.0 or 5.1 program audio
X75OPT-LC-6+2	DTS Loudness Control for 2.0 and 5.1 (separate programs)
X75OPT-LC-8	DTS Loudness Control for 4 x 2.0 program audio
X75OPT-LC+DM	DTS Loudness Control for 5.1 program audio with DTS Neural Surround™ Downmix output
X75OPT-MM	DTS Neural Surround™ 5.1 and rendered stereo content transitioning for DTV 5.1 production
X75OPT-MM-LC	DTS Neural Surround™ 5.1 and rendered stereo content transitioning for DTV 5.1 production with DTS Neural Loudness Control
X75OPT-UM	DTS Neural Surround™ UpMix DTV 5.1 production solution
X75OPT-UM-LC	DTS Neural Surround™ UpMix DTV 5.1 production solution with DTS Neural Loudness Control

Block Diagrams

Dolby

Figure 9-12 shows how Dolby is used in a typical X85/X75 application. Dolby E or Dolby Digital (AC-3) decoding takes place at ingest for voice-over.

NOTE

Only one Dolby or DTS Neural license may be purchased for each X75HD/X75SD module.

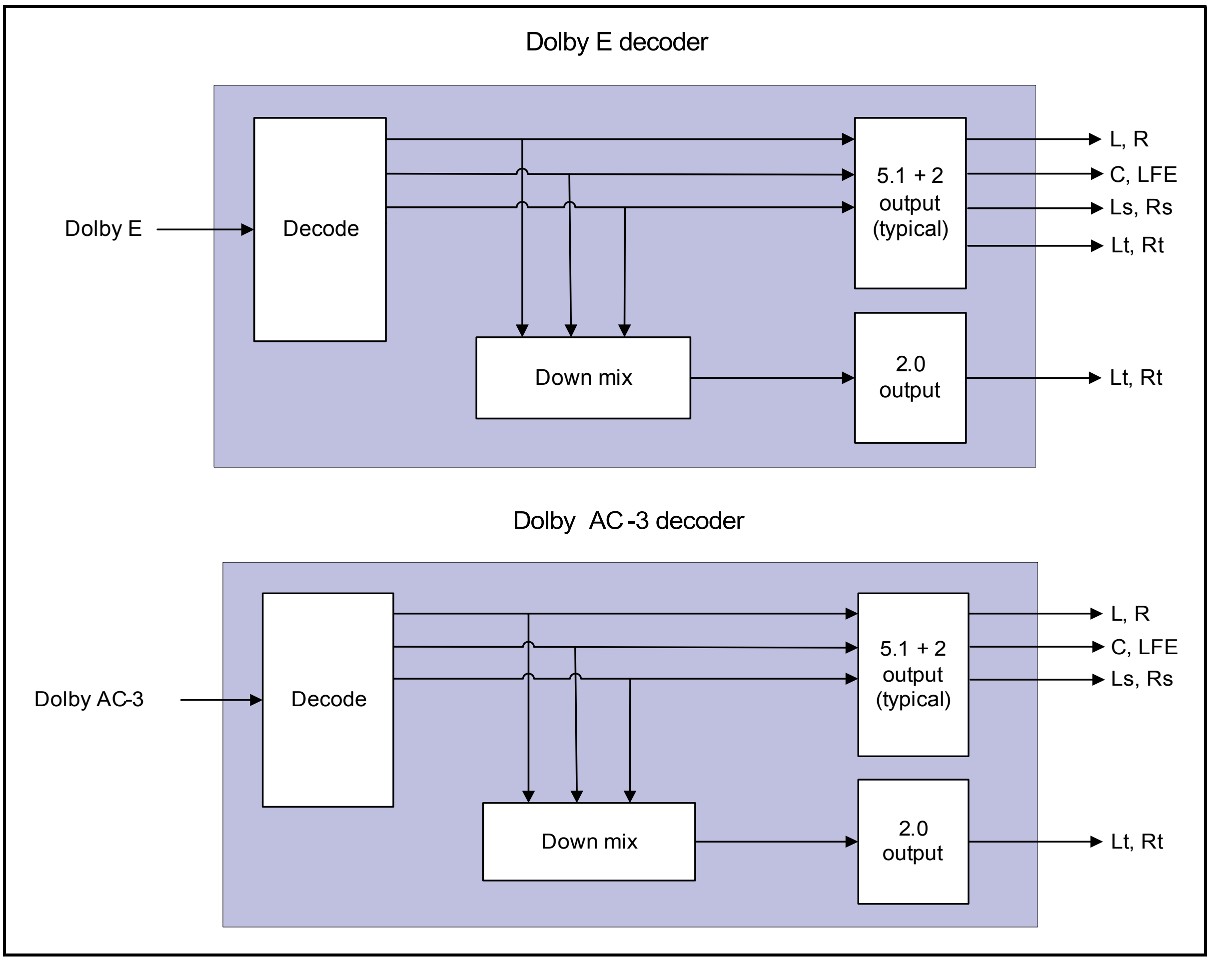


Figure 9-12. Dolby Block Diagrams

DTS Neural

The block diagrams shown in Figure 9-13 to Figure 9-15 illustrate the uses of the different DTS Neural audio license key options.

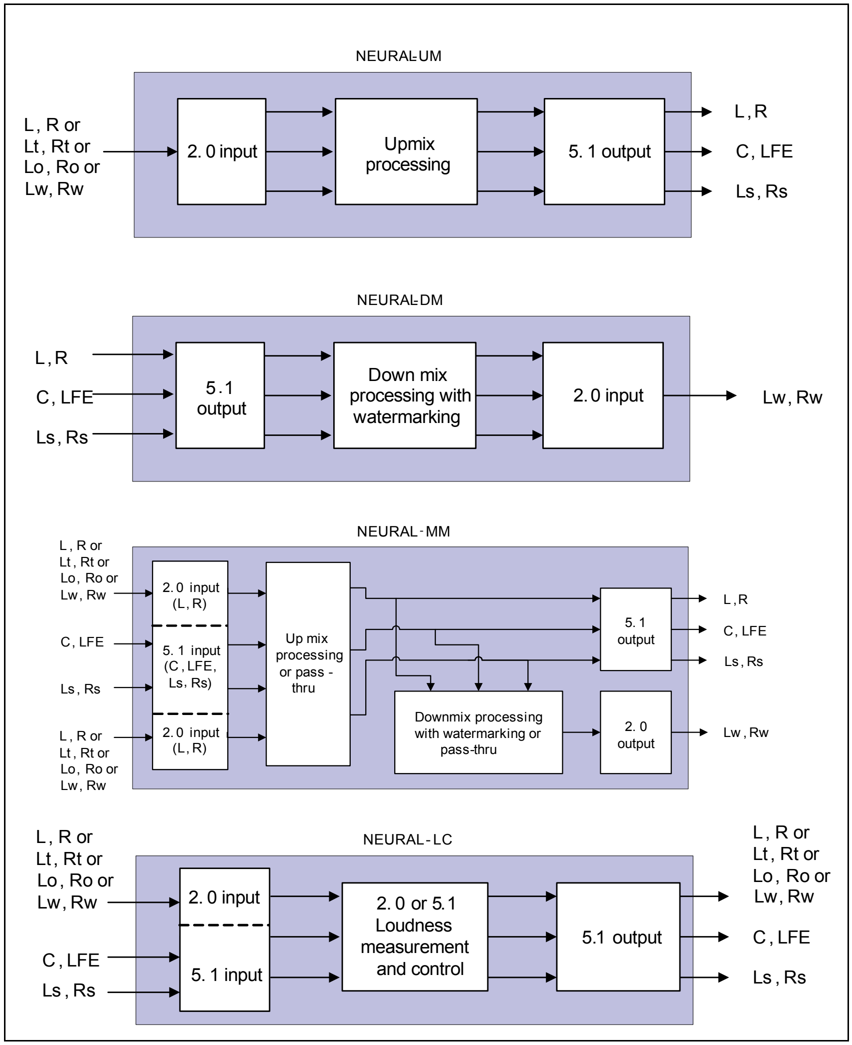


Figure 9-13. DTS Neural Audio Option Block Diagrams (1)

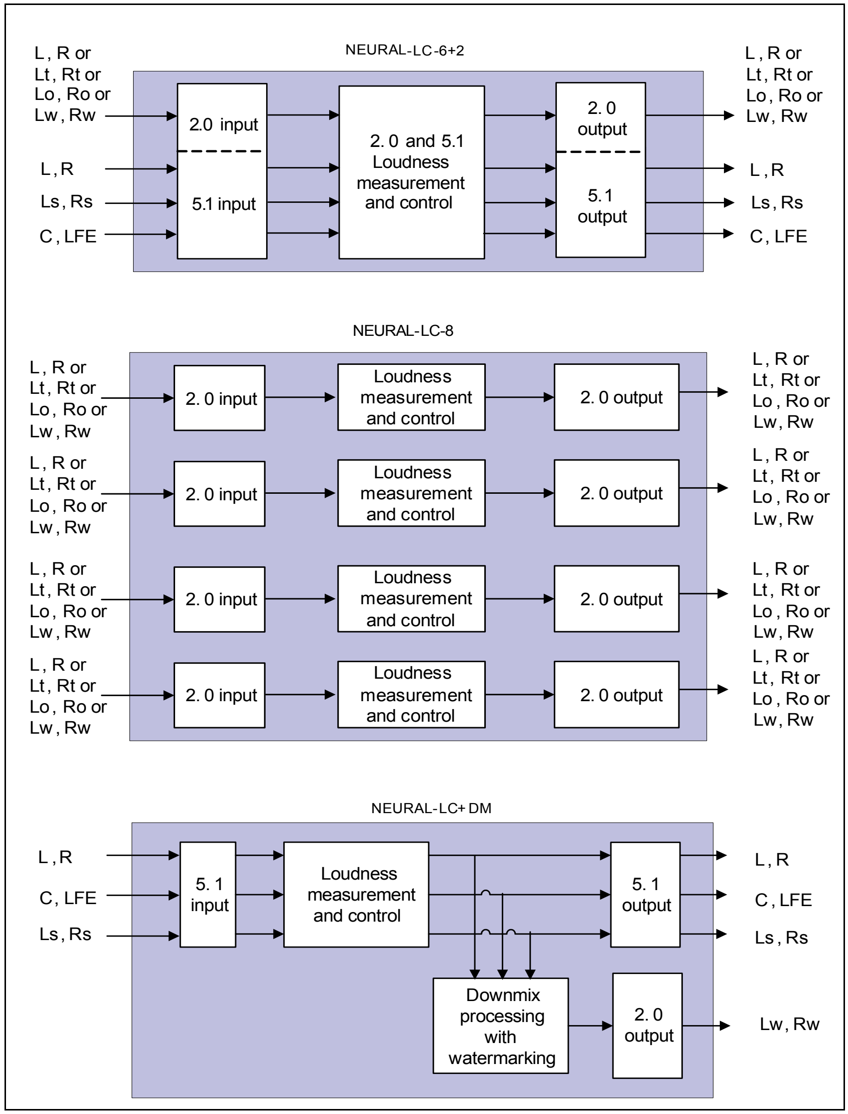


Figure 9-14. DTS Neural Audio Option Block Diagrams (2)

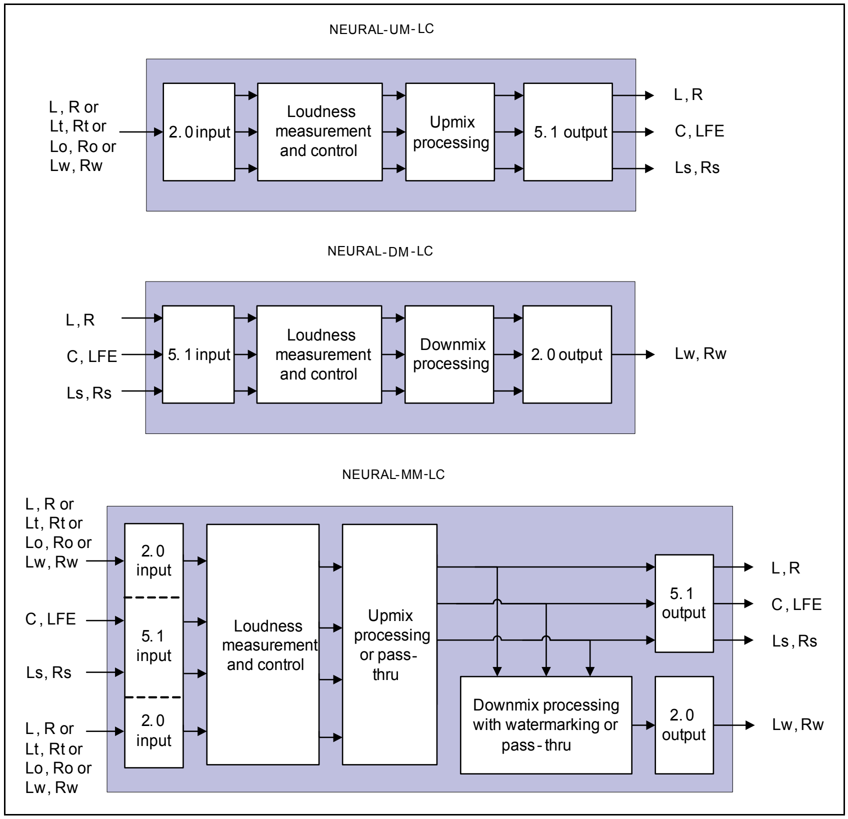


Figure 9-15. DTS Neural Audio Option Block Diagrams (3)

DTS Neural Audio Parameters

In addition to the X75HD/X75SD parameters in Table 4-5 on page 88, each DTS Neural module has other specific parameters:

- The X75OPT-UM and X75OPT-UM-LC include the UpMix parameters listed in Table 9-4 on page 253.
- The X75OPT-DM and X75OPT-DM-LC include the DownMix parameters listed in Table 9-5 on page 255.
- The X75OPT-MM and X75OPT-MM-LC include the MultiMerge parameters listed in Table 9-6 on page 257.
- The X75OPT-LC, X75OPT-LC-6+2, X75OPT-LC-8, and X75OPT-LC+DM include the Loudness Control parameters listed in Table 9-8 on page 262.

General Steps for Routing DTS Neural Audio

Follow these general steps when configuring DTS Neural products:

1. Determine the input sources for the DTS Neural module (either AES or demuxed audio).
2. Route the inputs intended for DTS Neural processing to a set of SRCs (sample rate convertors) by following **Audio Setup > Routing > Input > SRC*x* Input Select**.

   (SRCs **1** to **4** will be used, each being fed a stereo pair.)
3. Route the designated input SRCs to DTS Neural module inputs by following **Audio Setup > Routing > Input > AdvAudio Ch1** to **AdvAudio Ch8 > SRC 1a/b** to **SRC 4a/b**.

   These parameters assign the output of the SRCs that you selected in step 2. The output of these SRCs will then feed the DTS Neural module inputs.
4. Route the DTS Neural audio outputs to the SRC by assigning each output of the DTS Neural processing to the input of an SRC, under **Audio Setup > Routing > Input >** (unused **SRCx Input Select** > **AvAudProcCh*x/y***).
5. Route the designated output SRCs (sample rate convertors) to system outputs by following **Audio Setup > Routing > Output**, selecting the output SRCs from step 4 to feed either a mux channel or AES output.

DTS Neural Audio UpMix

Overview

The DTS Neural Surround UpMix renders any two channel audio source (stereo, matrix encoded stereo, LtRt, or DTS Neural Surround LwRw) as surround sound. The DTS Neural Surround UpMix can simultaneously position individual elements within the surround field, creating high levels of image stability and granularity.

The UpMix technology avoids taking “artistic license” with content by placing audio exactly where it would be heard in a professional LEDE (Live End Dead End) listening environment. For example, mono or pan-pot stereo will image in front of the listener, whereas stereo containing depth information will surround the listener.

You can use the DTS Neural Surround UpMix as a stand-alone unit to monitor stereo production, or you can use it in tandem with the DTS Neural Surround DownMix as a complete 5.1 transport solution.

Figure 9-16 below shows an UpMix taking a two-channel audio source (stereo, matrix encoded stereo, LtRt or DTS Neural Surround LwRw) and rendering a 5.1 multi-channel mix.

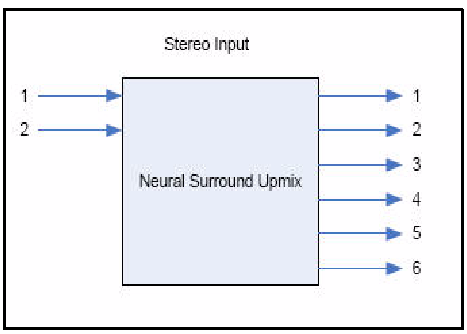


Figure 9-16. UpMix Block Diagram

Parameters

Table 9-4. DTS Neural Audio UpMix Parameters

Audio > DTS Neural > Upmix		
Parameter Name	**Function**	**Options**
Output Config	Controls the output channel configuration generated by the Upmix.	• 2.1 • 3.1 • 4.1 • **5.1**
Output Bias	Controls the soundstage depth of the upmix. (Values near -1.0 indicate that the soundstage image will be biased toward the surround channels; values near 1.0 indicate that the soundstage image will be biased toward the front channels)	-1.00 to 1.00 (**0**)
Upmix LFE Mute	Mutes the LFE channel output from the upmix	• Yes • **No**
LFE Up Cutoff	Controls the cutoff frequency of the low pass filter applied to the LFE channel before output	60 Hz to 140 Hz (**80** Hz)
Limiter Enable	Enables a limiter on the surround output from the upmix	• No • **Yes**
Limiter Threshold	Sets the upper threshold of the limiter applied to the output	-20 dBFS to **0** dBFS

DTS Neural Audio DownMix

Overview

The DTS Neural Surround DownMix enables 5.1 surround sound to be transported through any stereo infrastructure. The downmix process is based upon the principle that both natural stereo and 5.1 content are two-dimensional; both contain width and depth spatial attributes.

The DTS Neural Surround DownMix can represent six channels of discreet audio sources in a stereo downmix by transforming the sources into pure intensity and coherence encoding. By correcting overlaps of the signal sources in intensity, time, coherence, polarity, and phase before the six channels are combined, the DTS Neural Surround DownMix accounts for the problems suffered in traditional matrix encode systems—such as comb filtering, spatial location distortion, etc.

The proprietary DTS Neural Audio “watermark process” faithfully reproduces surround information when it is rendered by the DTS Neural Surround UpMix or any LtRt system. In brief, the DTS Neural Surround DownMix produces a stereo downmix that accurately represents the original content whether monitored in mono, stereo, matrix or DTS Neural 5.1 Surround Sound.

Figure 9-17 below shows a DownMix taking a multi-channel audio source. The downmix creates two-channel audio source using the DTS Neural Audio approach of embedding a watermark signal within the stereo audio signal patch. The watermark signal contains spatial and steering positioning information. The resulting stereo audio signal is also known as LwRw.

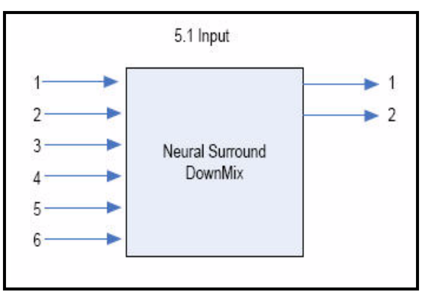


Figure 9-17. DownMix Block Diagram

Parameters

Table 9-5. DTS Neural Audio DownMix Parameters

Audio > DTS Neural > Downmix		
Parameter Name	**Function**	**Options**
LFE Down Filter En	Enables a low pass filter to the LFE input to the downmix	• No • **Yes**
LFE Down Cutoff	Sets the cutoff frequency of the low pass filter applied to the LFE input	60 Hz to 140 Hz (**80** Hz)
Limiter Enable	Enables a limiter on the stereo output of the downmix Note: 6 (5.1) channels of audio can naturally represent more total energy than 2 (stereo) channels of audio. Because of this, content downmixed from 5.1 to stereo will often have higher energy than any of the 5.1 channels individually. You can enable the limiter to protect content from digital 0 clipping and adjust the desired threshold.	• No • **Yes**
Limiter Threshold	Sets the upper threshold of the limiter applied to the output	-20 dBFS to **0** dBFS

DTS Neural Audio MultiMerge

Overview

The DTS Neural Surround MultiMerge enables broadcasters to transition from stereo to 5.1 surround sound, providing viewers with a 24/7 surround sound experience. With MultiMerge inline, 5.1 original content is passed unaffected to the viewer while original stereo content is upmixed to a 5.1 surround sound image. This provides the viewer with a consistent surround experience.

The transition between 5.1 and stereo occurs seamlessly without the need of operator intervention. By offering a 24/7 5.1 signal, AC3 metadata does not transition between 2/0 and 3/2 mode. This prevents audio clicks, pops, and dropouts. The process also avoids taking “artistic license” with content by placing audio exactly where it would be heard in a professional LEDE (Live End Dead End) listening environment. For example, mono or pan-pot stereo will image in front of the listener, whereas stereo containing depth information, or LtRt encoding, will surround the listener.

You can use the MultiMerge in combination with the DTS Neural Surround DownMix device to pass 5.1 through stereo-only facilities and therefore eliminate the need for costly master control upgrades.

Figure 9-18 shows how the MultiMerge takes a two-channel audio source (stereo, matrix encoded stereo, LtRt or DTS Neural Surround LwRw) and render a 5.1 multi-channel mix; in combination with taking original multi-channel content and creating a stereo downmixed signal, depending on the input configuration and content source used.

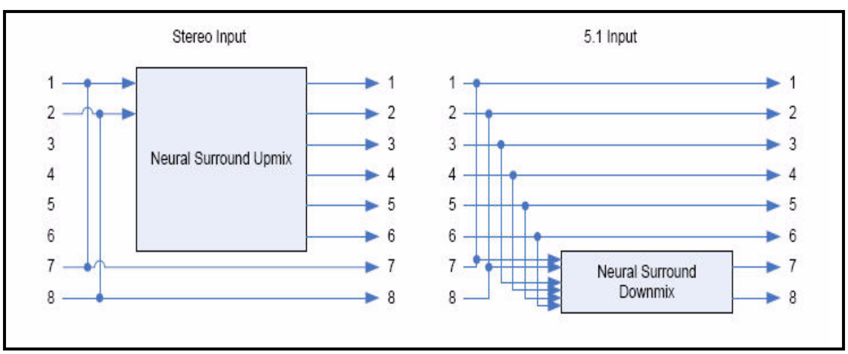


Figure 9-18. MultiMerge Block Diagram

Parameters

Table 9-6. DTS Neural Audio MultiMerge Parameters

Audio > DTS Neural > Multimerge		
Parameter Name	**Function**	**Options**
Input Selection Mode	Selects the input selection mode (See Table 9-7 on page 258 for descriptions of the options)	• **Mix** • Multi • Stereo • Aux • Multi Detect • Stereo Detect • Aux Detect • Multi Aux Stereo
Multimerge Mode	Controls the mode of the MultiMerge algorithm	• **Auto** • Pass Through • Up Mix
Detect Threshold	Controls the noise floor level for the detection while in Auto mode.	80 dBFS to -50 dBFS (**-60** dBFS)
Input Crossfade Time	Determines the transition time from one source to another	50 ms to 750 ms (**200** ms)
MM Crossfade Time	Controls the length of the audio crossfade used on the outputs when switching between Upmix and Passthrough modes automatically	50 ms to 750 ms (**200** ms)
Upmix LFE Mute	Mutes the LFE channel output from the upmix	• Yes • **No**
LFE Up Cutoff	Controls the cutoff frequency of the low pass filter applied to the LFE channel before output	60 Hz to 140 Hz (80 Hz)
LFE Down Filter En	Enables a low pass filter to the LFE input to the downmix	• No • **Yes**
LFE Down Cutoff	Sets the cutoff frequency of the low pass filter applied to the LFE input	60 Hz to 140 Hz (80 Hz)
Surround Limiter En	Enables a limiter on the surround output from the multimerge	• No • **Yes**

Table 9-6. DTS Neural Audio MultiMerge Parameters *(Continued)*

Parameter Name	Function	Options
Surround Threshold	Sets the upper threshold of the limiter applied to the surround output	-20 dBFS to **0** dBFS
Stereo Limiter en	Enables a limiter on the stereo output of the multimerge	• No • **Yes**
Stereo Threshold	Sets the upper threshold of the limiter applied to the stereo output	-20 dBFS to **0** dBFS

Table 9-7. Input Selection Mode Option Descriptions

Option	Notes
Mix	• This option sums the Aux input to the L/R of the 5.1 input. • The AES1, AES2, AES3 inputs are 5.1 (L/R, C/LFE, Ls/Rs) in. • The AES4 input is 2.0 in (L/R) in. • The AES1 output is a sum of AES 1 and AES 4 (AES1L+AES4L, AES1R+AES1R). • The AES2 output is C/LFE. • The AES3 output is LsRs.
Multi	• This option only sources audio from the 5.1 input. • Inputs are AES1 (L/R), AES2 (C/LFE), AES3 (Ls/Rs). • Outputs are AES1 (L/R), AES2 (C/LFE), AES3 (Ls/Rs). • AES4 is not used
Stereo	• Audio is sourced from only the L/R pair, while simultaneously muting the C/LFE and Ls/Rs pairs of the 5.1 input (used in situations where there is information on the other inputs that you would want to ignore). • Input is AES1 (L/R) • Output is AES1 (L/R) • AES2, AES3, AES4 are not used
Aux	• This option only sources audio from the Aux input. • Input is AES4 (L/R). • Output is AES4 (L/R). • AES1, AES2, AES3 is not used

Table 9-7. Input Selection Mode Option Descriptions *(Continued)*

<table>
<tr><th>Option</th><th>Notes</th></tr>
<tr><td>Multi Direct</td><td>If audio is present on the 5.1 input, the Aux input is overridden.
Inputs are 2.0 on AES1 (L/R) or 5.1 on AES1 (L/R), AES2 (C/LFE), AES3 (Ls/Rs) or 2.0 on AES4 (L/R).
Outputs are 5.1 on AES1 (L/R), AES2 (C/LFE), AES3 (Ls/Rs) and 2.0 on AES4 (L/R)</td></tr>
<tr><td>Stereo Detect</td><td>If audio is present on the L/R pair of the 5.1 input, the Aux input is overridden. Information on the C/LFE and Ls/Rs pairs of the 5.1 input is ignored.</td></tr>
<tr><td>Aux Detect</td><td>If audio is present on the Aux input, the 5.1 input is overridden.
This is an EAS application mode.
Inputs are 5.1 on AES1 (L/R), AES2 (C/LFE), AES3 (Ls/Rs), and EAS input on AES4 (L/R).
Output is 5.1 on AES1 (L/R), AES2 (C/LFE), AES3 (Ls/Rs).
When EAS appears on AES4 input, the output becomes EAS output on AES1 (L/R).</td></tr>
<tr><td>Multi Aux Stereo</td><td>If audio is present on the 5.1 input, the Aux input is overridden.
If only L/R is present on the 5.1 input and audio is present on the Aux, the L/R is overridden.
If there is no audio present on C/LFE, Ls/Rs, or Aux inputs, source from L/R.
<table>
<tr><th></th><th>MultiMerge Input</th><th>Scenario 1 (5.1)</th><th>Scenario 2 (Lt/Rt)</th><th>Scenario 3</th></tr>
<tr><td>AES 1</td><td>L/R</td><td>Yes</td><td>Yes (foreign language)</td><td>Yes (foreign language)</td></tr>
<tr><td>AES 2</td><td>C/LFE</td><td>Yes</td><td>No</td><td>No</td></tr>
<tr><td>AES 3</td><td>LS/RS</td><td>Yes</td><td>No</td><td>No</td></tr>
<tr><td>AES 4</td><td>Aux</td><td>No</td><td>Yes (desired language)</td><td>No</td></tr>
</table>
If 5.1 is present, take 5.1.
If there is no 5.1 or stereo available on either L/R or AUX, take AUX.
If stereo is only available on L/R, take L/R.</td></tr>
</table>

DTS Neural Loudness Control

Overview

DTS Neural Loudness Control is a loudness leveling device that uses advanced psycho-acoustic and signal processing techniques to accurately detect and regulate the perceived loudness of stereo and 5.1 sources. Using this feature, you can regulate audio without creating the perception of being “squished” or compressed.

One of the important aspects of loudness control is *frequency compensation*. Loudness studies dating back to Fletcher /Munson in the 1930s found that the human ear is more sensitive to different frequencies at different loudness levels. The **Frequency Compensation** parameter preserves the same perceptual frequency balance as the input signal, while correcting the loudness to match a desired **Target Level.**

For example, with **Frequency Compensation** enabled at a medium level, signals that fall below the **Target Level** setting have more gain added to middle frequencies than higher or lower frequencies. This preserves the original spectral balance. Conversely, signals that fall above the **Target Level** setting will have middle frequencies attenuated more than higher or lower frequencies. Because the **Frequency Compensation** parameter applies less gain to high and low frequencies, high or low frequency noise does not become over-emphasized.

The DTS Neural Loudness Control processing library is written in standard floating point ANSI C code, with a simple and straightforward API (application programming interface). The processing operates on separate mono buffers of floating point multichannel sources. In other words, a frame of audio samples for each channel L, R, C, LFE, Ls, and Rs is passed to the loudness control process. The loudness control engine outputs a frame of processed audio samples for each of the 5.1 output channels L, R, C, LFE, Ls, and Rs.

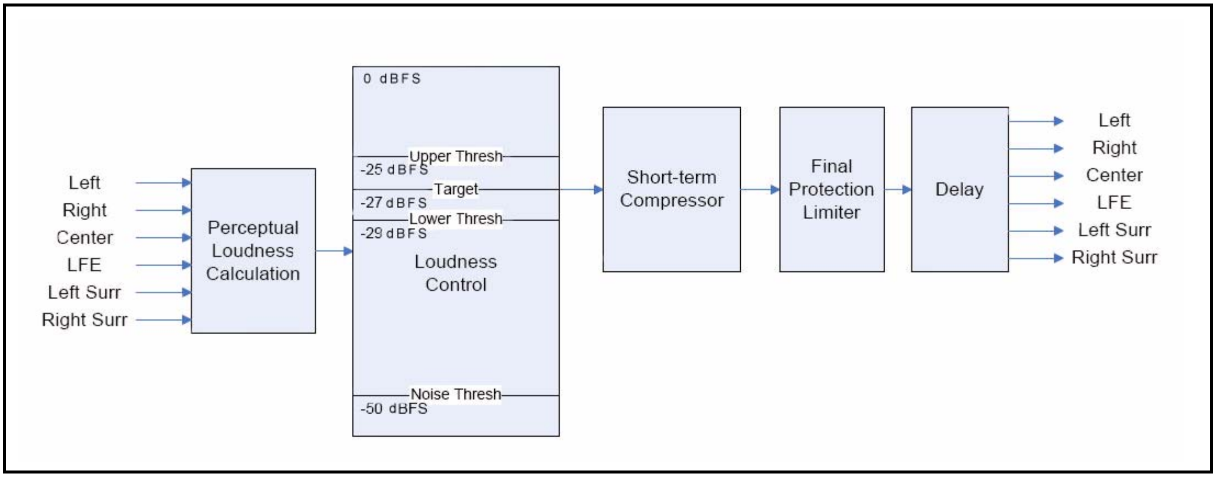


Figure 9-19. Loudness Control Block Diagram

Parameters

Table 9-8 on page 262 lists the parameters for the various DTS Neural Loudness Control options.

NOTE

Group 1 parameters in the X75OPT-LC-6+2 modules are repeated again for Group 2. In X75OPT-LC-8 modules, these parameters appear for Groups 1, 2, 3, and 4.

Table 9-8. DTS Neural Audio Loudness Control Parameters

Audio > DTS Neural > Loudness Control		
Parameter Name	**Function**	**Options**
Preset Select	Selects a loudness control preset	• Mild • Medium • Aggressive
Audio > DTS Neural > Loudness Control > Group 1 **Audio > DTS Neural > Loudness Control > Group 2 (X75OPT-LC-6+2 and X75OPT-LC-8 only)** **Audio > DTS Neural > Loudness Control > Group 3 (X75OPT-LC-8 only)** **Audio > DTS Neural > Loudness Control > Group 4 (X75OPT-LC-8 only)**		
Bypass	Loudness Control bypass	• **LC1 enable*** • LC1 bypass
Target Level	Loudness Control Target Level	-31 dBFS to -1 dBFS (**-27** dBFS*)
LC Ratio	Loudness Control Ratio	0.00 to 1.00 (**0.95***)
Upper Threshold	Loudness Control Upper Threshold	0 dB to 12 dB (**0 dB***)
Lower Threshold	Loudness Control lower threshold	-12 dB to 0 dB (**0 dB***)
Freeze Window	Loudness Control freeze window	0.0 to 6.0 (**1.0***)
Noise Floor	Loudness Control Noise Floor	-60 dBFS to -40 dBFS (**-50** dBFS*)
Attack Time	Loudness Control Attack Time	0 ms to 120 ms (**20** ms*)
Release Time	Loudness Control Release Time	40 ms to 200 ms (**120** ms*)
Freq Compensation	Sets the reference level relative to the loudness shaping	• Off • **Low*** • Medium • High
Compressor Threshold	Sets the threshold at which short term peaks are accepted	0 dB to 12 dB (**5 dB***)
Compressor Ratio	Loudness Control Compressor Ratio	0.0 to 1.0 (**0.4***)
Output Limiter En	Loudness Control Output Limiter Enable	• No • **Yes***
Output Limiter Threshold	Loudness Control Output Limiter Threshold	-20 dBFS to 0 dBFS (**0 dBFS**)

* Defaults based on **Medium p**reset

Appendix A

Cables and Pinouts

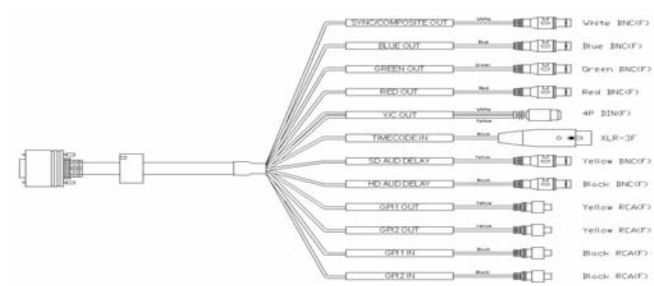
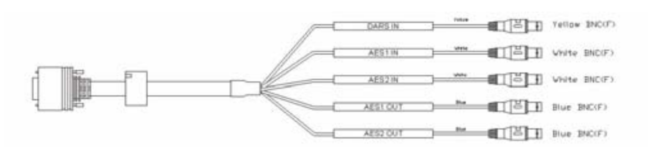
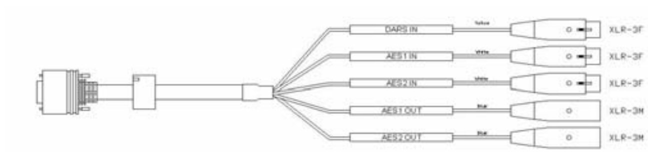
Overview

This appendix describes various cable options and I/O, video, and audio cable pinouts (both standard and optional) available for use with the X85 and X75. The following topics are covered in this chapter:

Summary of Cables and Cable Sets

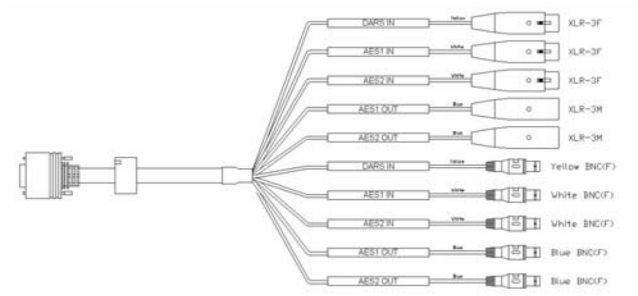
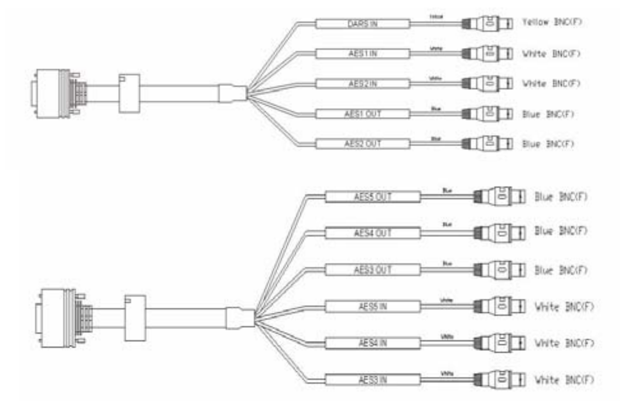
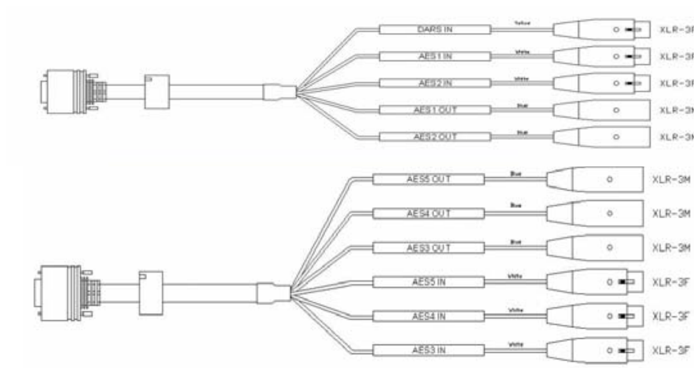
Table A-1 lists all of the standard and optional cables and cable sets used in different X85 and X75 packages. Details begin on page 277.

Table A-1. Cables and Cable Sets

Part Number	Type	Components
Multiple Input/Output (Non-Audio) Set		
X75OPTCAB-MULTI	Single cable	X75OPTCAB-MULTI 
DVI-D Output		
X75OPTCAB-DVI	Single cable	X75OPTCAB-DVI 
Audio Cables and Cable Sets		
X75OPTCAB-8-C	Single cable (BNC)	X75OPTCAB-8-C 
X75OPTCAB-8-X	Single cable (XLR)	X75OPTCAB-8-X 

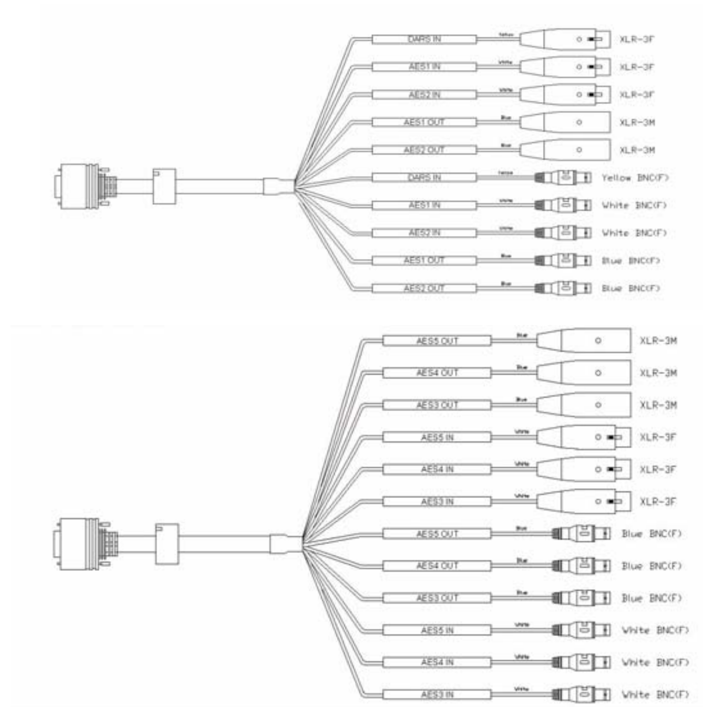
Standard/Optional	Description	Major Features
Optional	One cable for multi input/output connectors • Sync/comp out • Blue, Green, and Red out • Y/C out • SDTV and HDTV audio delay • GPI1 and GPI2 in • GPI1 and GPI2 out	1 ft (30 cm) multi I/O breakout cable with the following connector types: • DB26(M) to 6 x BNC(F), 1 x XLR(F), 1 x MiniDin4(F), and 4 x RCA(F)
Optional	One cable for DVI-D single-link output	DVI-D to DVI-D (digital-single link) cable
Standard (X75SD)	One cable for 8-channel audio synchronizer, with the following unbalanced coax AES connectors: • AES1, AES2, and DARS in • AES1 and AES2 out	1 ft (30 cm) breakout cable with the following connector types: • DB26(M) to 5 x BNC(F)
Optional	One cable for 8-channel audio synchronizer, with the following balanced XLR AES connectors: • AES1, AES2, and DARS in • AES1 and AES2 out	1 ft (30 cm) breakout cable with the following connector types: • DB26(M) to 3 x XLR(F) • 2 x XLR(M)

Cables and Cable Sets (Continued)

Part Number	**Type**	**Components**
Audio Cables and Cable Sets (Continued)		
X75OPTCAB-8-CX	Single cable (BNC and XLR)	X75OPTCAB-8-CX 
X75OPTCAB-16-C	Cable set (BNC)	X75OPTCAB-8-C and CAB-X75HD-COAX cables 
X75OPTCAB-16-X	Cable set (XLR)	X75OPTCAB-8-X and CAB-X75HD-XLR cables 

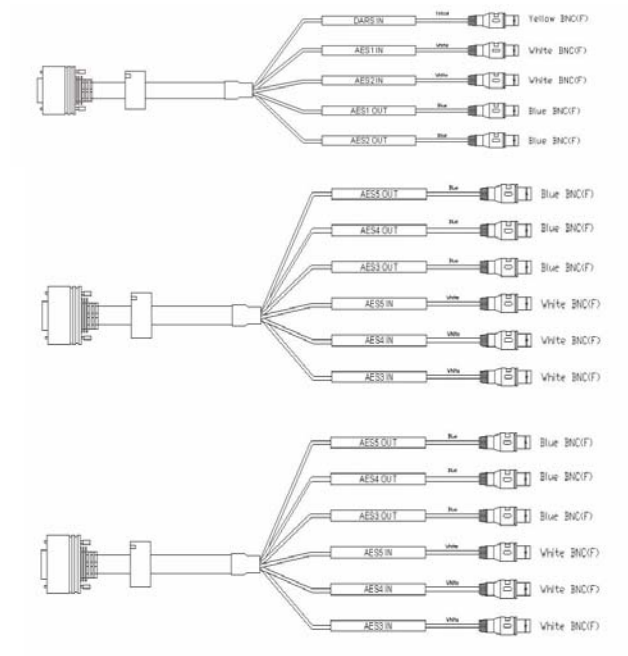
Standard/Optional	Description	Major Features
Optional	One cable for 8-channel audio synchronizer, with the following unbalanced coax AES and XLR connectors: • AES1, AES2, and DARS in • AES1 and AES2 out	1 ft (30 cm) breakout cable with the following connector types: • DB26(M) to 5 x BNC(F) • 3 x XLR(F) • 2 x XLR(M)
Standard (HD)	Two cable sets for 16-channel audio synchronizer, with unbalanced coax AES connectors • AES1, AES2, and DARS in • AES1 and AES2 out • AES3, AES4, and AES5 in • AES3, AES 4, and AES 5 out	2 X 1 ft. (30 cm) breakout cables with the following connector types: • DB26(M) to 5 x BNC(F) • DB44(M) to 6 x BNC(F)
Optional	Two cable sets for 16-channel audio synchronizer, with balanced XLR AES connectors • AES1, AES2, and DARS in • AES1 and AES2 out • AES3, AES4, and AES5 in • AES3, AES 4, and AES 5 out	2 X 1 ft (30 cm) breakout cables with the following connector types: • DB26(M) to 3 x XLR(F) and 2 x XLR(M) • DB44(M) to 3 x XLR(F) and 3 x XLR(M)

Cables and Cable Sets (Continued)

<table>
<tr><th>Part Number</th><th>Type</th><th>Components</th></tr>
<tr><td colspan="3">Audio Cables and Cable Sets (Continued)</td></tr>
<tr><td>X75OPTCAB-16-CX</td><td>Cable set
(BNC and XLR)</td><td>X75OPTCAB-8-CX and CAB-X75HD-COMBO cables

</td></tr>
</table>

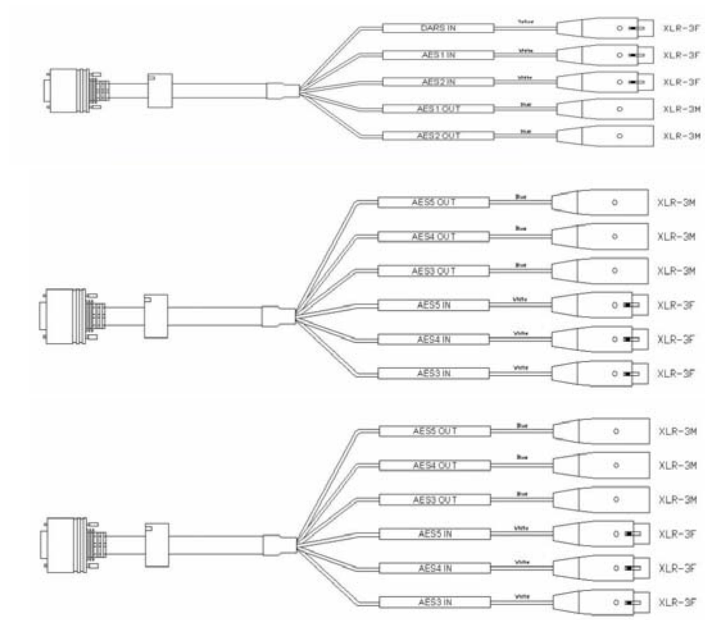
Standard/Optional	Description	Major Features
Optional	Two cables for 16-channel audio synchronizer, unbalanced coax AES and balanced XLR AES • AES1, AES2, and DARS in • AES1 and AES2 out • AES3, AES4, and AES5 in • AES3, AES 4, and AES 5 out	2 X 1 ft (30 cm) breakout cables with the following connector types: • DB26(M) to 5 x BNC(F), 3 x XLR(F), and 2 x XLR(M) • DB44(M) to 6 x BNC(F), 3 x XLR(F), and 3 x XLR(M)

Cables and Cable Sets (Continued)

Part Number	Type	Components
Audio Cables and Cable Sets (Continued)		
X75OPTCAB-32-C	Cable set (BNC)	One X75OPTCAB-8-C and two X CAB-X75HD-COAX cables 

Standard/Optional	Description	Major Features
Included with X75OPT-AS-32 (-L)	Three cable sets for 32-channel audio synchronizer, with unbalanced coax AES connectors • AES1, AES2, and DARS in • AES1 and AES2 out • AES3, AES4, and AES5 in and out • AES6, AES7, and AES8 in and out	3 X 1 ft (30 cm) breakout cables with the following connector types: • DB26(M) to 5 x BNC(F) • 2 X DB44(M) to 6 x BNC(F)

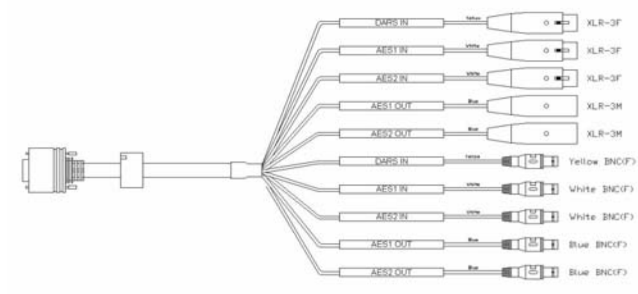
Cables and Cable Sets (Continued)

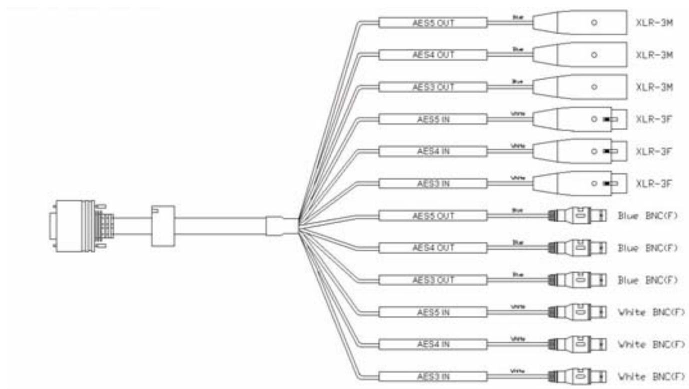
Part Number	Type	Components
Audio Cables and Cable Sets (Continued)		
X75OPTCAB-32-X	Cable set (XLR)	One X75OPTCAB-8-X and two CAB-X75HD-XLR cables 

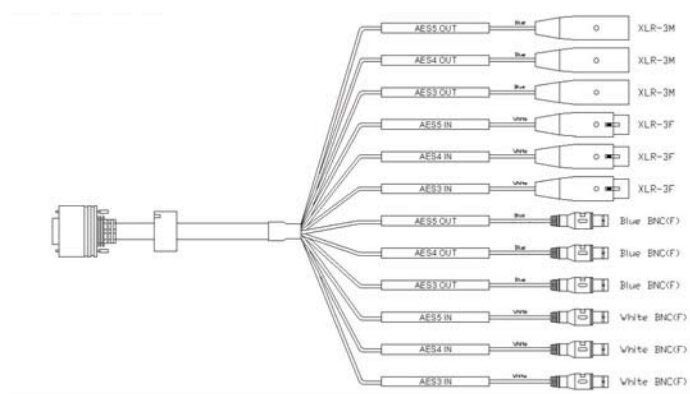
Standard/Optional	Description	Major Features
Optional	Three cable sets for 32-channel audio synchronizer, with balanced XLR AES connectors • AES1, AES2, and DARS in • AES1 and AES2 out • AES3, AES4, and AES5 in and out • AES6, AES7, and AES8 in and out	3 X 1 ft (30 cm) breakout cables with the following connector types: • DB26(M) to 3 x XLR(F) and 2 x XLR(M) • 2 X DB44(M) to 3 x XLR(F) and 3 x XLR(M)

Cables and Cable Sets (Continued)

<table>
<tr><th>Part Number</th><th>Type</th><th>Components</th></tr>
<tr><td colspan="3">Audio Cables and Cable Sets (Continued)</td></tr>
<tr><td>X75OPTCAB-32-CX</td><td>Cable set
(BNC and XLR)</td><td>One X75OPTCAB-8-CX and two CAB-X75HD-COMBO cables







</td></tr>
</table>

Standard/Optional	Description	Major Features
Optional	Three cable sets for 32-channel audio synchronizer, unbalanced coax AES and balanced XLR AES • AES1, AES2, and DARS in • AES1 and AES2 out • AES3, AES4, and AES5 in and out • AES6, AES7, and AES8 in and out	3 X 1 ft (30 cm) breakout cables with the following connector types: • DB26(M) to 5 x BNC(F), 3 x XLR(F), and 2 x XLR(M) • 2 X DB44(M) to 6 x BNC(F), 3 x XLR(F), and 3 x XLR(M)

Analog Audio Connections

Figure A-1 shows the analog audio input and output terminal blocks.

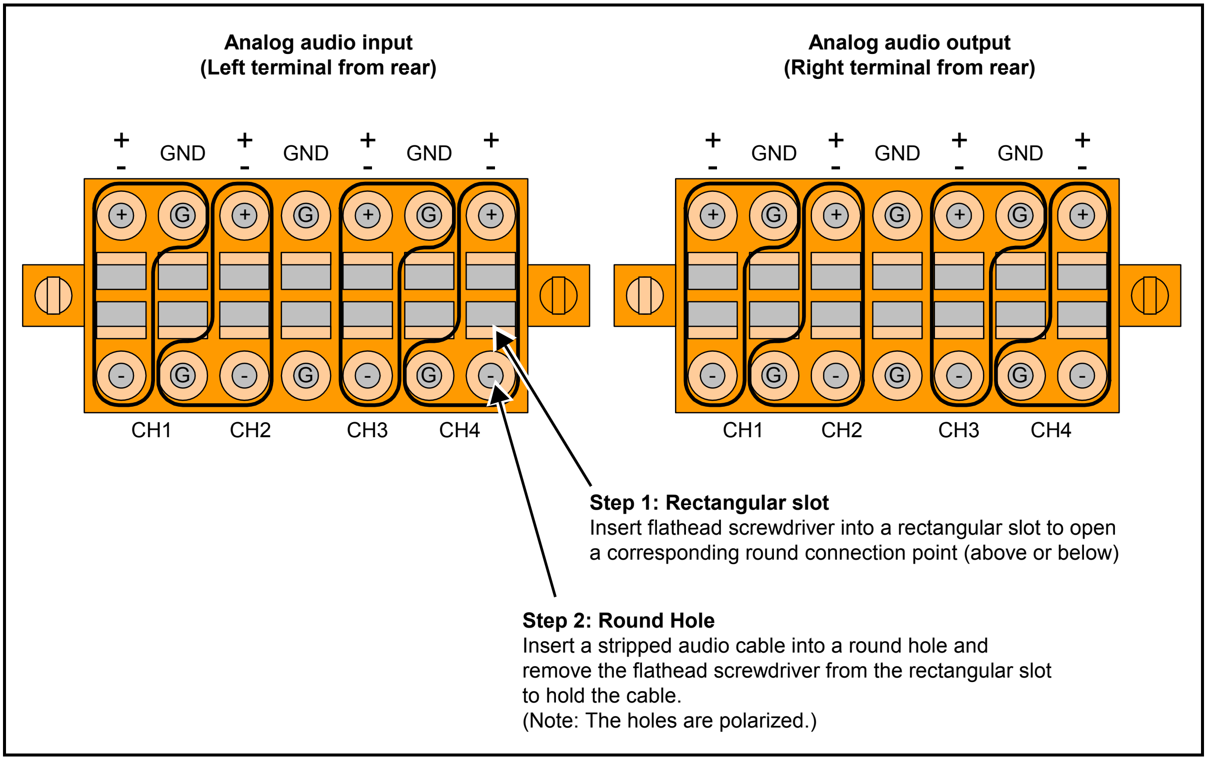


Figure A-1. Analog Audio Input and Output Terminal Blocks

Individual Cables

Multi I/O Cable (X75OPTCAB-MULTI)

Figure A-2 identifies the cable connectors available on the optional multiple input/output X75OPTCAB-MULTI cable.

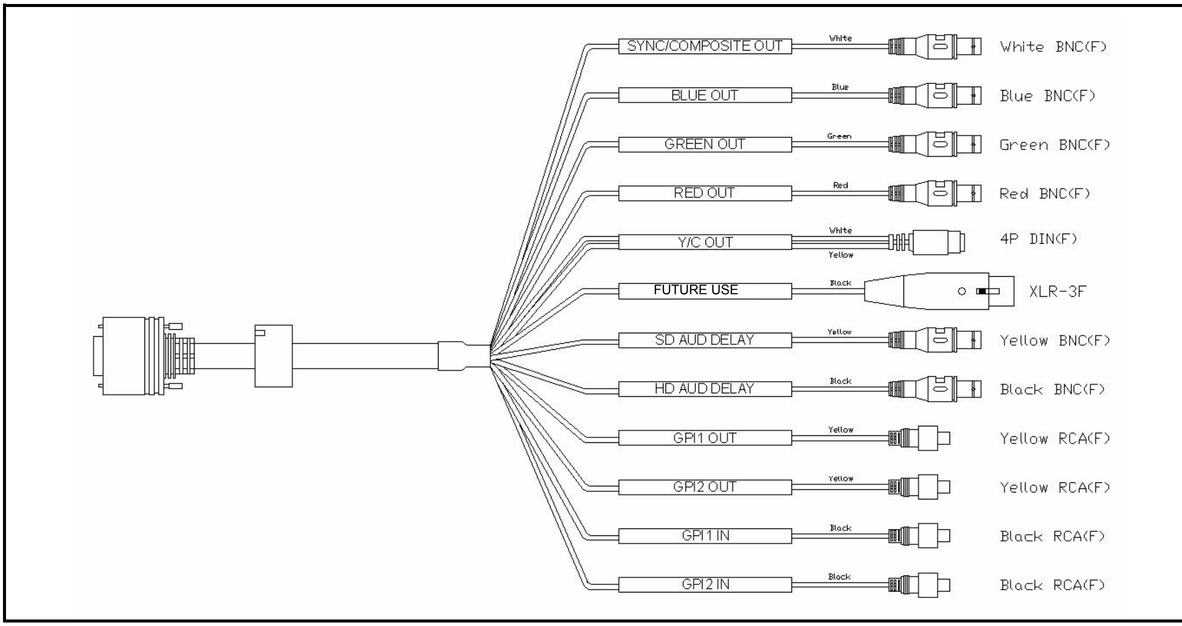


Figure A-2. X75OPTCAB-MULTI Cable Connectors

Figure A-3 shows the pinouts for the X75OPTCAB-MULTI DB-26M connector.

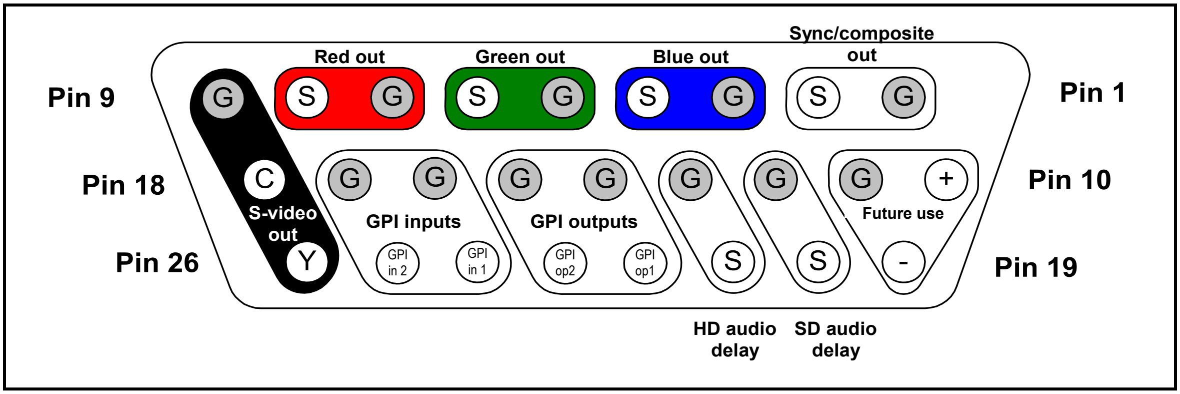


Figure A-3. X75OPTCAB-MULTI I/O Connector Pinout

Table A-2 describes each pin on the X75OPTCAB-MULTI DB-26M connector and its connection type.

Table A-2. X75OPTCAB-MULTI Pinout Descriptions

Pin Number	Connection Type	Description
1	BNC-Gnd	Sync/composite out ground
2	BNC	Sync/composite out signal
3	BNC-Gnd	Blue out ground
4	BNC	Blue out signal
5	BNC-Gnd	Green out ground
6	BNC	Green out signal
7	BNC-Gnd	Red out ground
8	BNC	Red out signal
9	4-Pin DIN-1-Gnd 4-Pin DIN-2-Gnd	S-video (Y) ground S-video (C) ground
10	XLR-2	Future use
11	XLR-1-Gnd	Future use
12	BNC-Gnd	SDTV audio delay ground
13	BNC-Gnd	HDTV audio delay ground
14	RCA-Gnd	GPI out 1 ground

Table A-2. X75OPTCAB-MULTI Pinout Descriptions

Pin Number	Connection Type	Description
15	RCA Gnd	GPI out 2 ground
16	RCA Gnd	GPI in 1 ground
17	RCA Gnd	GPI in 2 ground
18	4-Pin DIN-4	S-video (C) out
19	XLR-3	Future use
20	BNC	SDTV audio delay out
21	BNC	HDTV audio delay out
22	RCA	GPI out 1
23	RCA	GPI out 2
24	RCA	GPI in 1
25	RCA	GPI in 2
26	4-Pin DIN-3	S-video (Y) out

DVI-D Output Cable (X75OPTCAB-DVI)

The optional DVI-D to DVI-D digital single-link cable connects a monitor to the DVI Out port on the back of the X85/X75 unit. This is a straight connection cable with no breakouts, and a single DVI-D connector for digital video output.

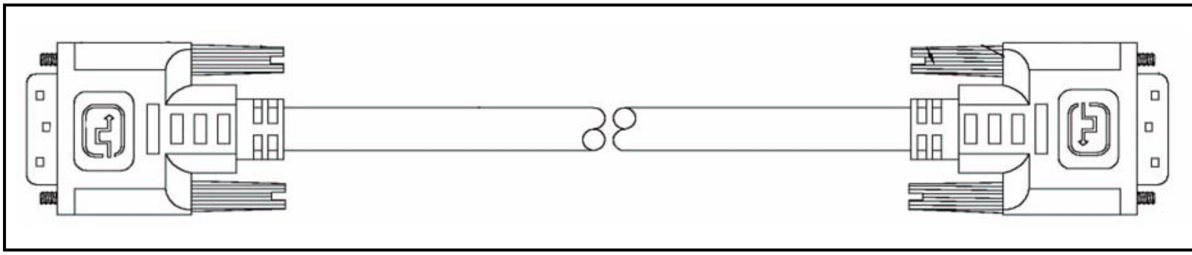


Figure A-4. DVI-D to DVI-D Cable

Audio Coax Cable (X75OPTCAB-8-C)

Figure A-5 identifies the cable connectors available on the AES/EBU audio X75OPTCAB-8-C coax cable, supplied standard with each X85/X75 unit.

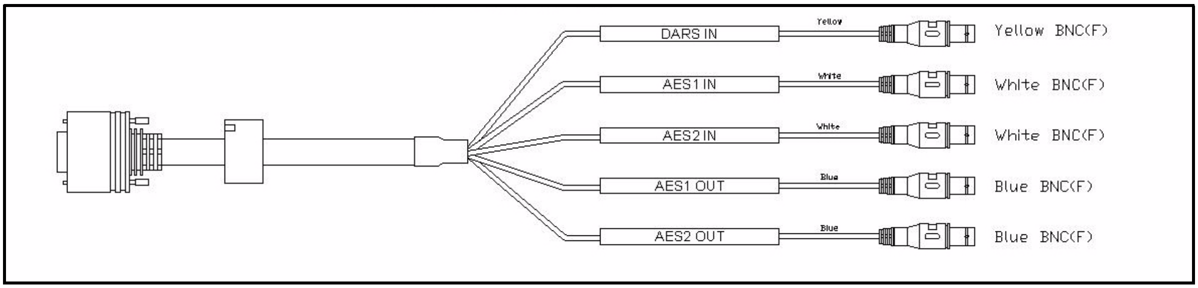


Figure A-5. X75OPTCAB-8-C Cable Connectors

Figure A-6 shows the pinouts for the X75OPTCAB-8-C DB-26M connector.

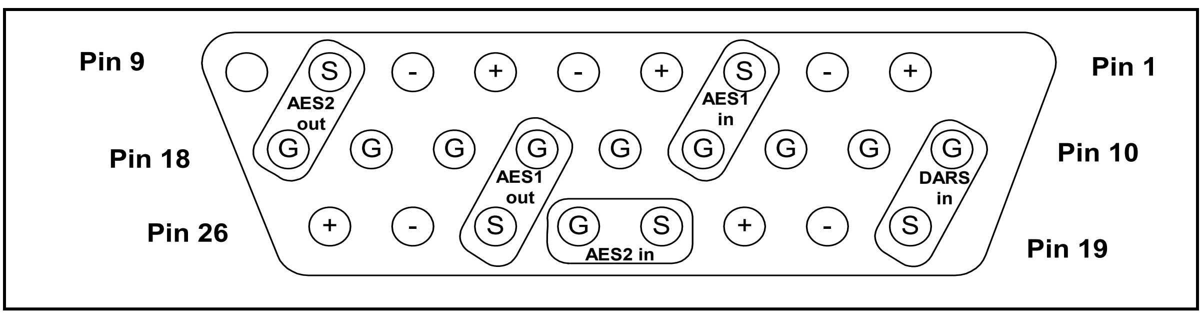


Figure A-6. X75OPTCAB-8-C Connector Pinout

Table A-3 describes each pin on the X75OPTCAB-8-C DB-26M connector and its connection type.

Table A-3. X75OPTCAB-8-C Pinout Description

Pin Number	Connection Type	Description
1	NC	N/A
2	NC	N/A
3	BNC	Unbalanced AES1 in
4	NC	N/A

Table A-3. X75OPTCAB-8-C Pinout Description

Pin Number	Connection Type	Description
5	NC	N/A
6	NC	N/A
7	NC	N/A
8	BNC	Unbalanced AES2 out
9	NC	N/A
10	BNC-GND	Unbalanced DARS in ground
11	NC	N/A
12	NC	N/A
13	BNC-GND	Unbalanced AES1 in ground
14	NC	N/A
15	BNC-GND	Unbalanced AES1 out ground
16	NC	N/A
17	NC	N/A
18	BNC-GND	Unbalanced AES2 out ground
19	BNC	Unbalanced DARS in
20	NC	N/A
21	NC	N/A
22	BNC	Unbalanced AES2 in
23	BNC-GND	Unbalanced AES2 in ground
24	BNC	Unbalanced AES1 out
25	NC	N/A
26	NC	N/A

Audio Coax Cable (CAB-X75HD-COAX)

The CAB-X75HD-COAX cable is included in the X75OPTCAB-16-C package (1 per) and the X75OPTCAB-32-C package (2 per). When the second CAB-X75HD-COAX cable is used in the X75OPTCAB-32-C package, the pinout numbering changes from the diagram below. For the second cable, AES3 becomes AES6, AES4 becomes AES7, and AES5 becomes AES8.

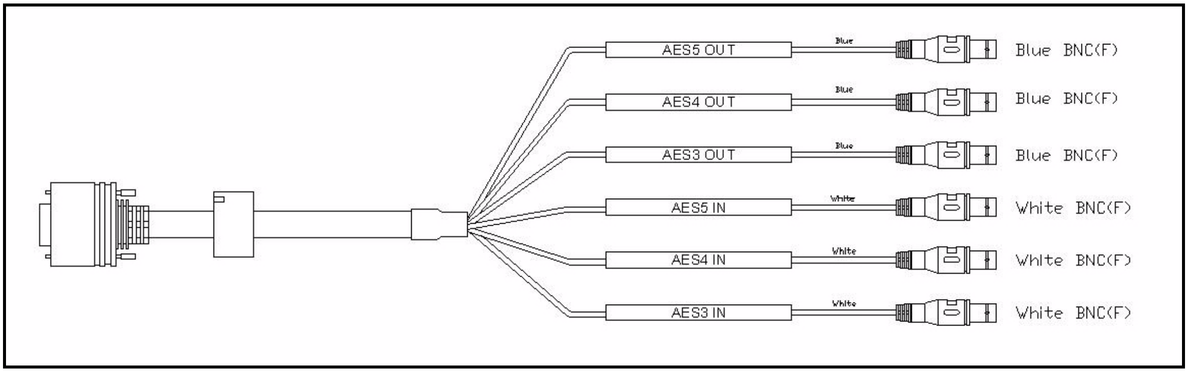


Figure A-7. CAB-X75HD-COAX Cable Connectors

Figure A-8 shows the pinouts for the X75OPTCAB-16-C DB-44M connector.

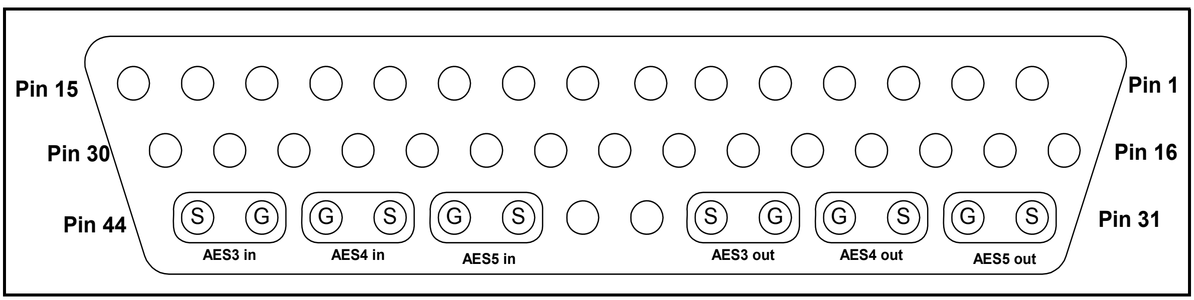


Figure A-8. CAB-X75HD-COAX Connector Pinout

Table A-4 describes each pin on the CAB-X75HD-COAX DB-44M connector and its connection type.

Table A-4. CAB-X75HD-COAX Pinout Description

Pin Number	Connection Type	Description
1 through 30	NC	N/A
31	BNC	Unbalanced AES5 out
32	BNC-Gnd	Unbalanced AES5 out Ground
33	BNC	Unbalanced AES4 out
34	BNC-Gnd	Unbalanced AES4 out ground
35	BNC-Gnd	Unbalanced AES3 out ground
36	BNC	Unbalanced AES3 out
37	NC	N/A
38	NC	N/A
39	BNC	Unbalanced AES5 in
40	BNC-Gnd	Unbalanced AES5 in ground
41	BNC	Unbalanced AES4 in
42	BNC-Gnd	Unbalanced AES4 in ground
43	BNC-Gnd	Unbalanced AES3 in ground
44	BNC	Unbalanced AES3 in

Audio BNC/XLR Cable (X75OPTCAB-8-XC)

Figure A-9 identifies the cable connectors available on the optional AES/EBU X75OPT-CAB-8-XC combination BNC/XLR audio cable, supporting both unbalanced and balanced audio signals.

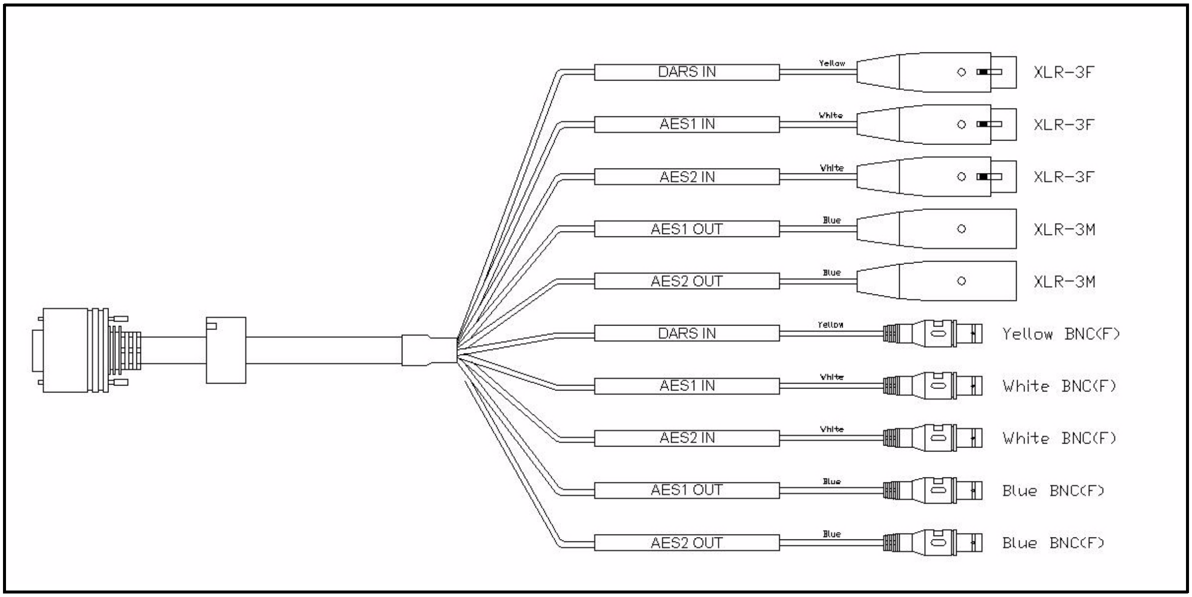


Figure A-9. X75OPTCAB-8-XC Cable Connectors

Figure A-10 shows the pinouts for the X75OPTCAB-8-XC DB-26M connector.

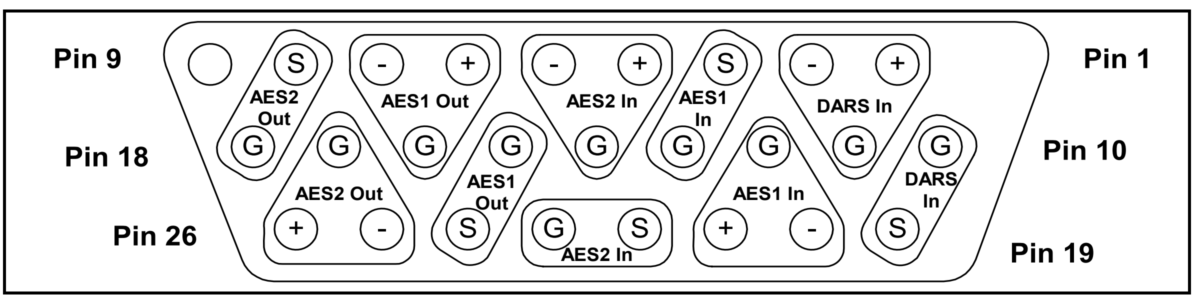


Figure A-10. X75OPTCAB-8-XC Connector Pinout

Table A-5 describes each pin on the X75OPTCAB-8-XC DB-26M connector and its connection type.

Table A-5. X75OPTCAB-8-XC Pinout Description

Pin Number	Connection Type	Description
1	XLR-2	Balanced DARS in (+)
2	XLR-3	Balanced DARS in (-)
3	BNC	Unbalanced AES1 in
4	XLR-2	Balanced AES2 in (+)
5	XLR-3	Balanced AES2 in (-)
6	XLR-2	Balanced AES1 out (+)
7	XLR-3	Balanced AES1 out (-)
8	BNC	Unbalanced AES2 out
9	NC	N/A
10	BNC-GND	Unbalanced DARS in ground
11	XLR-1-GND	Balanced DARS in ground
12	XLR-1-GND	Balanced AES1 in ground
13	BNC-GND	Unbalanced AES1 in ground
14	XLR-1-GND	Balanced AES2 in ground
15	BNC-GND	Unbalanced AES1 out ground
16	XLR-1-GND	Balanced AES1 out ground
17	XLR-1-GND	Balanced AES2 out ground
18	BNC-GND	Unbalanced AES2 out ground
19	BNC	Unbalanced DARS in
20	XLR-3	Balanced AES1 in (-)
21	XLR-2	Balanced AES1 in (+)
22	BNC	Unbalanced AES 2 in
23	BNC-GND	Unbalanced AES2 in ground
24	BNC	Unbalanced AES1 out
25	XLR-3	Balanced AES2 out (-)
26	XLR-2	Balanced AES2 out (+)

Audio BNC/XLR Cable (CAB-X75HD-COMBO)

Figure A-11 identifies the cable connectors available on the optional AES/EBU CAB-X75HD-COMBO combination BNC/XLR audio cable, which supports both unbalanced and balanced audio signals. When the second CAB-X75HD-COMBO cable is used in the X75OPTCAB-32-C set, the pinout numbering changes from the diagram below. For the second cable, AES3 becomes AES5, AES4 becomes AES6, and AES5 becomes AES8.

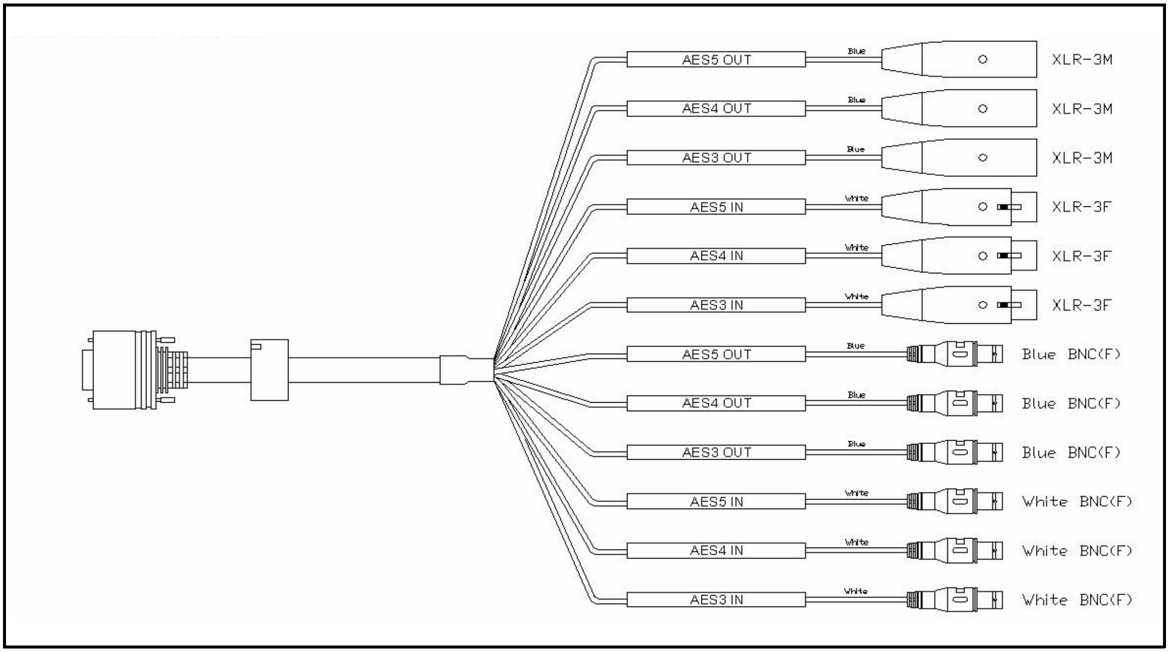


Figure A-11. CAB-X75HD-COMBO Cable Connectors

Figure A-12 shows the pinouts for the X75OPTCAB-16-CX DB-44M connector.

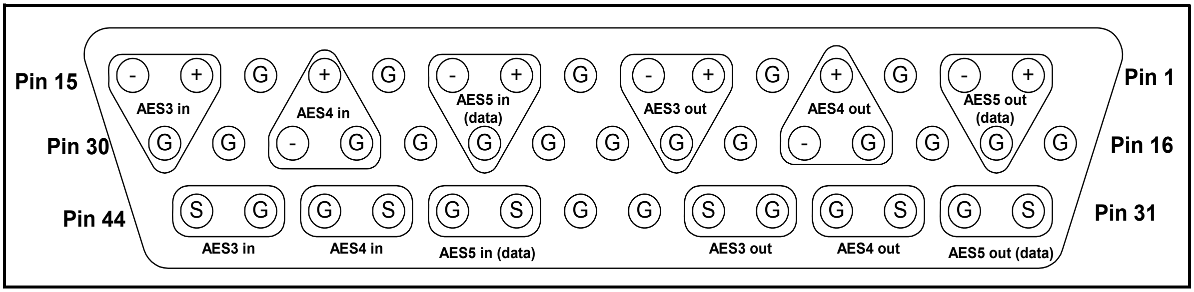


Figure A-12. CAB-X75HD-COMBO Connector Pinout

Table A-6 describes each pin on the CAB-X75HD-COMBO DB-44M connector and its connection type.

Table A-6. CAB-X75HD-COMBO Pinout Description

Pin Number	Connection Type	Description
1	XLR-2	Balanced AES5 out (+)
2	XLR-3	Balanced AES5 out (-)
3	NC	N/A
4	XLR-2	Balanced AES4 out (+)
5	NC	N/A
6	XLR-2	Balanced AES3 out (+)
7	XLR-3	Balanced AES3 out (-)
8	NC	N/A
9	XLR-2	Balanced AES5 in (+)
10	XLR-3	Balanced AES5 in (-)
11	NC	N/A
12	XLR-2	Balanced AES4 in (+)
13	NC	N/A
14	XLR-2	Balanced AES3 in (+)
15	XLR-3	Balanced AES3 in (-)
16	NC	N/A

Table A-6. CAB-X75HD-COMBO Pinout Description

Pin Number	Connection Type	Description
17	XLR-1-Gnd	Balanced AES5 out ground
18	NC	N/A
19	XLR-1-Gnd	Balanced AES4 out ground
20	XLR-3	Balanced AES4 out (-)
21	NC	N/A
22	XLR-1-Gnd	Balanced AES3 out ground
23	NC	N/A
24	NC	N/A
25	XLR-1-Gnd	Balanced AES5 in ground
26	NC	N/A
27	XLR-1-Gnd	Balanced AES4 in ground
28	XLR-3	Balanced AES4 in (-)
29	NC	N/A
30	XLR-1-Gnd	Balanced AES3 in ground
31	BNC	Unbalanced AES5 out
32	BNC-Gnd	Unbalanced AES5 out ground
33	BNC	Unbalanced AES4 out
34	BNC-Gnd	Unbalanced AES4 out ground
35	BNC-Gnd	Unbalanced AES3 out ground
36	BNC	Unbalanced AES3 out
37	NC	N/A
38	NC	N/A
39	BNC	Unbalanced AES5 in
40	BNC-Gnd	Unbalanced AES5 in ground
41	BNC	Unbalanced AES4 in
42	BNC-Gnd	Unbalanced AES4 in ground
43	BNC-Gnd	Unbalanced AES3 in ground
44	BNC	Unbalanced AES3 in

Optional Audio XLR Cable (X75OPTCAB-8-X)

Figure A-13 identifies the cable connectors available on the optional AES/EBU X75OPTCAB-8-X XLR audio cable, which supports balanced audio signals.

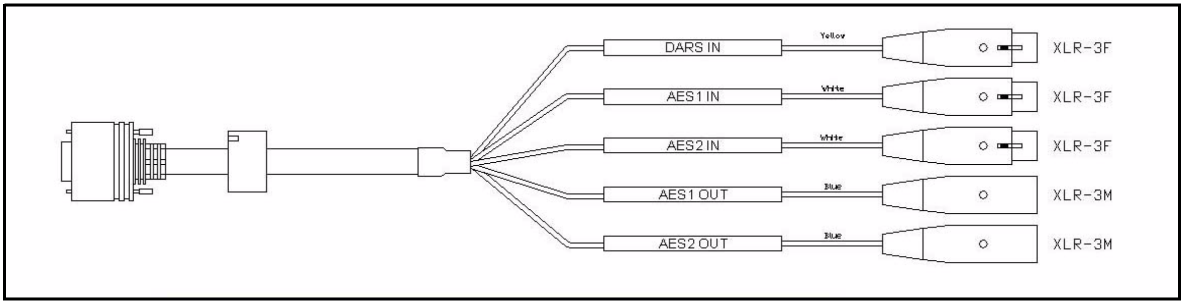


Figure A-13. X75OPTCAB-8-X Cable Connectors

Figure A-14 shows the pinouts for the X75OPTCAB-8-X DB-26M connector.

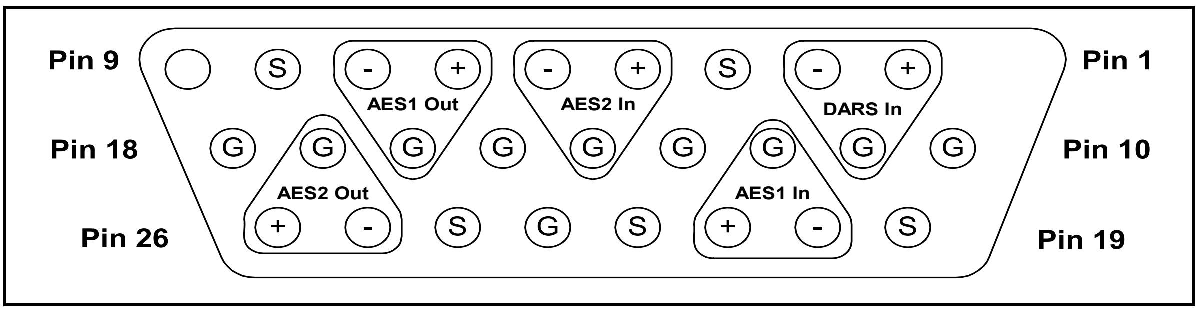


Figure A-14. X75OPTCAB-8-X Connector Pinout

Table A-7 on page 291 describes each pin on the X75OPTCAB-8-X DB-26M connector and its connection type.

Table A-7. X75OPTCAB-8-X Pinout Description

Pin Number	Connection Type	Description
1	XLR-2	Balanced DARS in (+)
2	XLR-3	Balanced DARS in (-)
3	NC	N/A
4	XLR-2	Balanced AES2 in (+)
5	XLR-3	Balanced AES2 in (-)
6	XLR-2	Balanced AES1 out (+)
7	XLR-3	Balanced AES1 out (-)
8	NC	N/A
9	NC	N/A
10	NC	N/A
11	XLR-1-GND	Balanced DARS in ground
12	XLR-1-GND	Balanced AES1 in ground
13	NC	N/A
14	XLR-1-GND	Balanced AES2 in ground
15	NC	N/A
16	XLR-1-GND	Balanced AES1 out ground
17	XLR-1-GND	Balanced AES2 out ground
18	NC	N/A
19	NC	N/A
20	XLR-3	Balanced AES1 in (-)
21	XLR-2	Balanced AES1 in (+)
22	NC	N/A
23	NC	N/A
24	NC	N/A
25	XLR-3	Balanced AES2 out (-)
26	XLR-2	Balanced AES2 out (+)

Optional Audio XLR Cable (X75OPTCAB-XLR)

Figure A-15 identifies the cable connectors available on the optional AES/EBU X75OPTCAB-XLR audio cable, which is one of the cables in the X75OPTCAB-16-X and X75OPTCAB-32-X sets. This cable supports balanced audio signals. When the second X75OPTCAB-XLR cable is used in the X75OPTCAB-32-X set, the pinout numbering changes from the diagram below. AES3 becomes AES6, AES4 becomes AES7, and AES5 becomes AES8.

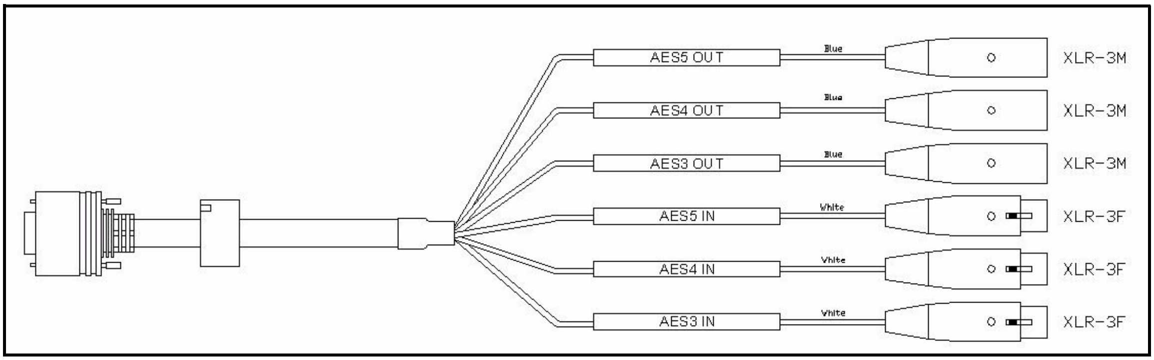


Figure A-15. X75OPTCAB-XLR Cable Connectors

Figure A-16 shows the pinouts for the X75OPTCAB-16-X DB-44M connector.

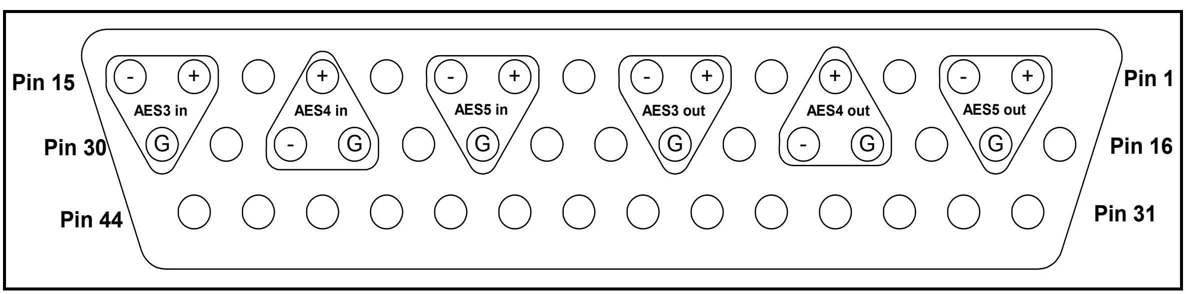


Figure A-16. X75OPTCAB-XLR Connector Pinout

Table A-8 describes each pin on the X75OPTCAB-XLR DB-44M connector and its connection type.

Table A-8. X75OPTCAB-XLR Pinout Description

Pin Number	Connection Type	Description
1	XLR-2	Balanced AES5 out (+)
2	XLR-3	Balanced AES5 out (-)
3	NC	N/A
4	XLR-2	Balanced AES4 out (+)
5	NC	N/A
6	XLR-2	Balanced AES3 out (+)
7	XLR-3	Balanced AES3 out (-)
8	NC	N/A
9	XLR-2	Balanced AES5 in (+)
10	XLR-3	Balanced AES5 in (-)
11	NC	N/A
12	XLR-2	Balanced AES4 in (+)
13	NC	N/A
14	XLR-2	Balanced AES3 in (+)
15	XLR-3	Balanced AES3 in (-)
16	NC	N/A
17	XLR-1-Gnd	Balanced AES5 out ground
18	NC	N/A
19	XLR-1-Gnd	Balanced AES4 out ground
20	XLR-3	Balanced AES4 out (-)
21	NC	N/A
22	XLR-1-Gnd	Balanced AES3 out ground
23	NC	N/A
24	NC	N/A
25	XLR-1-Gnd	Balanced AES5 in ground
26	NC	N/A

Table A-8. X75OPTCAB-XLR Pinout Description

Pin Number	Connection Type	Description
27	XLR-1-Gnd	Balanced AES4 in ground
28	XLR-3	Balanced AES4 in (-)
29	NC	N/A
30	XLR-1-Gnd	Balanced AES3 in ground
31 through 44	NC	N/A

Appendix B

Troubleshooting

Overview

The following appendix describes some of the more common problems you might encounter while using the X85 and X75, and it offers tips on how to correct these problems.

The following problems areas are covered:

- "Network Connectivity" on page 296
- "Front Panel Display" on page 299
- "Video Conversion" on page 304
- "Audio" on page 308
- "Alarms" on page 313
- "Softkey Installation" on page 315
- "Flash Memory" on page 317
- "Upgrading Firmware" on page 320
- "Problems with Pinging" on page 327

Network Connectivity

Forgotten IP address

Problem

You can't remember the set IP address for a specific X85/X75 unit and are having a problem communicating with it on the network.

Solution

Temporarily set the unit into the factory default IP Address. Follow these steps to set the default IP address:

1. Push the **Def IP** DIP switch on the back of the unit to the *down* position (see Figure B-1).

   This resets the unit to the following default network addresses:

   - Device IP: 192.168.100.250
   - Subnet mask: 255.255.255.0
   - Gateway: 192.168.100.250

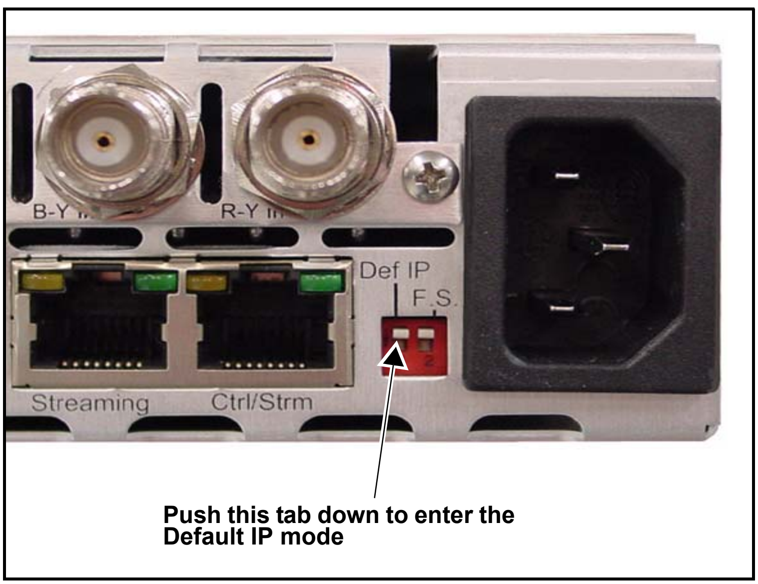


Figure B-1. Location of DEF IP DIP Switch

2. Launch the X85/X75 Web browser software, and then navigate to the **System Config > Setup** menu.
3. Select the **Device IP** parameter to view the currently set IP address and then use this IP address to access the unit again.
4. Return the **Def IP DIP** switch to the up position.
5. Reboot the system.

No response to SNMP Walk command

Problem

After writing the SNMP configuration settings back to the X85/X75 using the CCS Pilot/Navigator application, the unit does not respond to the **SNMPWalk** command.

Solution

Obtain and reinstall the latest version Harris CCS software application, and then rewrite the SNMP configuration back into the X85/X75 unit. (CCS Pilot 2.99 and Navigator 2.1 do not write back the proper community strings within the x75agent.xnv file.)

To install the X85/X75 agent configuration file work-around manually, follow these steps:

1. Start up a DOS box from the Windows application and then go to the C:\ directory.
2. Use the following ftp commands to read out the x75agent.xnv file from the X85/X75:
   - ftp <**ip address of x75 frame** >
   - User: **leitch**
   - Password: **LeitchAdmin** (case sensitive)
   - Get **x75agent.xnv**
3. Edit the **x75agent.xnv** file with a Notepad application.
4. Go to the [**v1v2cCommunityTbl**] section and then edit the lines as shown below:

   (The public and private community names can be anything.)
   - 1=**public readOnly(2)**
   - 2=**private readCreate(4)**
5. Write the edited file back to X75 by issuing the command: **put x75agent.xnv**
6. Type **bye** to exit ftp session.
7. Reboot the X75 frame.

Front Panel Display

Control panel display is blank

Problem

Even though the unit has been powered up, no information appears on the VFD screen. However, the LEDs on the control panel seem to be functioning.

Solution 1

The **F.S.** (fail-safe) switch at the back of the X85/X75 is in the down position (see Figure B-2); this is preventing the unit from booting up properly. When the switch is down, the runtime code is suspended, and only the FTP port is opened for the file transfer.

Restore the switch to the up position, and then re-power the unit to see if it reboots correctly.

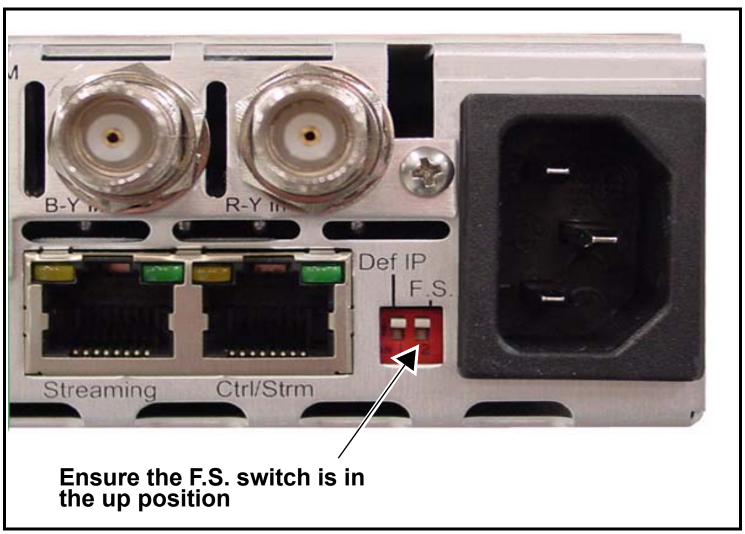


Figure B-2. Fail-safe Switch

Solution 2

Some of the early X75 and X75-RCP units have experienced premature failure of capacitor C38 (part # 101-000067-00; see Figure B-3 on page 301) made by Vishay (part # VJ1210Y334J(K)XBAT). This results in a blank VFD (Vacuum Florescent Display).

Obtain the serial number of the X75 unit and the original PO number. Then contact Harris Customer Support. The front control panel assembly (part number 170-000483-00) will be exchanged free of charge. No special programming or configuration is required.

The failure nature of this C38 capacitor is that it slowly builds up the resistance in an inverse way that eventually shorts out the power line supplying the power to the VFD. The resistance across this capacitor should be more than several thousand ohms, but failed capacitors are measured below several hundred ohms.

The VFD will function without this DC filtering capacitor. If your situation is urgent, carefully remove or replace this capacitor. Follow these steps to remove and replace the capacitor:

1. Pull the frame 2 inches from the rack and then remove a total of 14 screws from the top and bottom of the front panel assembly.
2. Detach the front panel from the chassis by gently pulling the panel forward.

   (There is a mating connector on the left side of the chassis.)
3. Remove and replace the defective capacitor.

See “Installing a Frame-Mounted Local Control Panel” on page 337 for more details.

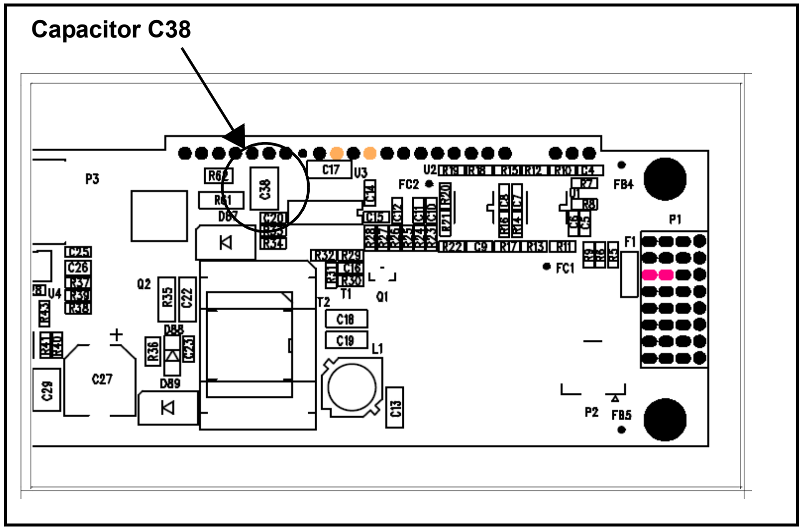


Figure B-3. Location of Failed Capacitor Behind VFD

Solution 3

If you have verified that capacitor C38 is good, but there is still no display on the VFD, it is most likely that the VFD (part number 123-000003-00) has failed.

Contact Harris Customer Service for a Returned Merchandise Authorization (RMA) number. Then return or exchange the control panel assembly (part number 170-000483-00).

Analog input video control menu is not showing up

Problem

The menus on the VFD appear to be functioning normally, but the **Analog Input Video** control menu does *not* appear, or it seems to appear randomly.

Solution 1

If the appearance of the **Analog Input Video** menu is random, the software version of the unit is 1.4 and therefore, an upgrade to version 1.5 or greater is required.

Visit the software downloads section of the Harris broadcast website, and then download the latest version of the software. Open up the **Release Notes** file for the update instructions, and then proceed with the firmware upgrade.

Solution 2

The X75OPT-PQM or X75OPT-A3D module, or its interconnecting stacker pins are not installed correctly. To remove and reinstall the module, follow these steps:

1. Remove the X75 from the rack, and then open the lid.
2. Remove the X75OPT-A3D or X75OPT-PQM submodule from the mainboard.
3. Inspect the stacker pins for proper installation and connection.

   (See “Installing and Removing X75OPT-A3D or X75OPT-PQM Video Modules” on page 357 for more information.)
4. Re-install the submodule and lid.
5. Install the frame back into the rack and verify the presence of the **Analog Input Video** menu upon power up.

Solution 3

The X75OPT-A3D or X75OPT-PQM submodule may be defective. If another A3D or PQM submodule is available, swap the submodule to determine if the original is defective.

If the submodule is proven defective, contact Harris Customer Service for an RMA number, and then return the module to Harris.

Power LEDs are off and there is no display on the LCP

Problem

The local control panel appears to be "dead." There are no functioning LEDs, no buttons are lit, and the VFD is blank.

Solution 1

The unit is not receiving power. The AC cord(s) have become loose. Ensure the power cords are firmly pressed into the unit.

Solution 2

The internal power supply is defective. Open the lid of the X85 or X75, and using a voltage meter, determine if the power supply is producing +24VDC on the main DC cable(s). See Figure B-4 for the location of the power supply and Table B-1 for pinout information.

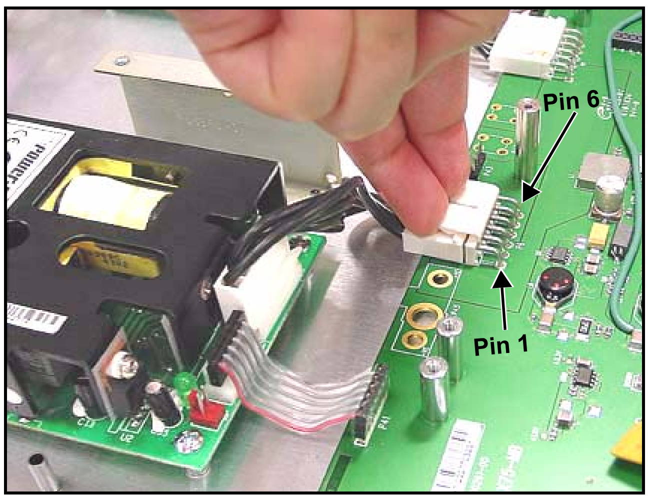


Figure B-4. Location of Power Supplies DC Cables

Table B-1. Main DC Cable Pinouts

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
+24V	+24V	+24V	Ground	Ground	Ground

Solution 3

The internal flash memory is corrupted or locked up. See page 317 for details on restarting the flash memory.

Video Conversion

Performing an HD cross-conversion but can't see the down-converted signal using an X75

Problem

The X75HD is taking 1080i input and forcing the output HD standard to 720p for cross-conversion, but the down-converted signal is not present at the SDTV outputs. There is no visible SDTV content.

1080i/59.94 → HD1 input // ==== Internal processing ==== // HD output → 720p/59.94

+ ==== // SD output → No visible HD content

Solution:

The unit does not have the softkey option that makes it possible to perform simultaneous crossconversion and downconversion. Purchase and install the X75OPT-HDDUOCON software key option.

Follow these steps to purchase and install the HDDUOCON option:

1. Confirm the option is *not* installed by following this path:
   System Config > Status/Version Info > S/W Options

   The word `HDDUOCON` will display if the option is installed.
2. If the option is not installed, follow this path to find and record the unit's serial number:
   System Config > Status/Version Info > Serial Number
3. Contact the Harris sales department and then purchase the option.

Enter the softkey using either an X75 control panel, the X85/X75 Web browser , or a CCS software application. (The valid key character sets are numbers 2~9 and letters A~Z.)

To enter a softkey number using the control panel, follow these steps:

1. Select **System Config > Setup > License Key**.
2. Use the control knob and the **Enter** button to enter the characters.
3. Press the **Exit** button when completed.

To enter the softkey number using the Web Browser, follow these steps:

1. Type the IP address of the X75 unit you are upgrading into the **Address** field of your browser (Figure B-5).

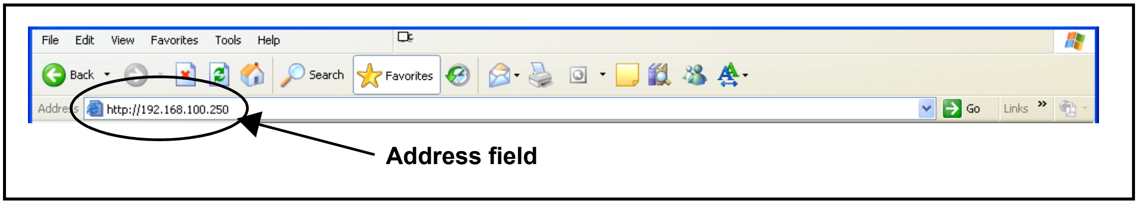


Figure B-5. IP Address Insertion to Add X75OPT-HDDUOCON Option

2. Navigate to **System Config > Setup > License Key**.
3. Type in the supplied softkey codes.

   The option should now function.

To enter the softkey number using a CCS software application, follow these steps:

1. With your X75 unit selected in Navigator, click the **Device** tab in the **Configuration** window.
2. Type your license key in the **License Key** field.
3. Click the **Write and Reboot** button.

   The writing process includes a validation step to prevent you from writing an invalid license key.

Won’t perform up and down conversions simultaneously on an X75

Problem:

The unit performs upconversions and it performs downconversions, but not both at the same time.

Solution:

The unit does not have the softkey option that makes it possible to perform simultaneous crossconversion and downconversion. Purchase and install the X75OPT-HDDUOCON software key option.

Follow these steps to purchase and install the HDDUOCON option:

1. Confirm the option is *not* installed by following this path:
   System Config > Status/Version Info > S/W Options

   The word `HDDUOCON` will display if the option is installed.
2. If the option is not installed, follow this path to find the unit’s serial number:
   System Config > Status/Version Info > Serial Number
3. Contact the Harris sales department and then purchase the option.

Enter the softkey using either an X75 control panel, the X85/X75 Web browser , or a CCS software application. (The valid key character sets are numbers 2~9 and letters A~Z.)

To enter a softkey number using the control panel, follow these steps:

1. Select **System Config > Setup > License Key**.
2. Use the control knob and the **Enter** button to enter the characters.
3. Press the **Exit** button when completed.

To enter the softkey number using the Web Browser, follow these steps:

1. Type the IP address of the X85/X75 unit you are upgrading into the **Address** field of your browser (see Figure B-6 on page 307).

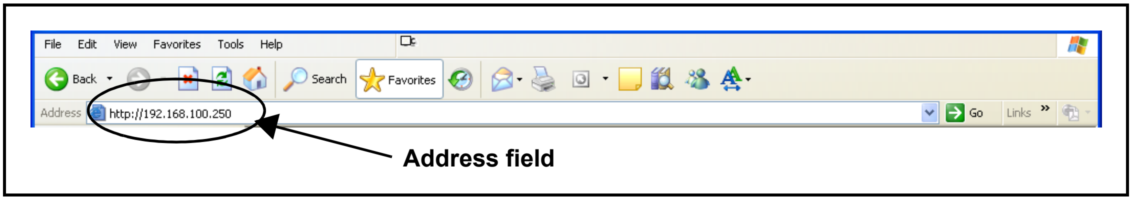


Figure B-6. IP Address Insertion to Add X75OPT-HDDUOCON Option

2. Navigate to **System Config** > **Setup** > **License Key**.
3. Type in the supplied softkey codes.

   The option should now function.

To enter the softkey number using a CCS software application, follow these steps:

1. With your X75 selected in Navigator, click the **Device** tab in the **Configuration** window.
2. Type your license key in the **License Key** field.
3. Click the **Write and Reboot** button.

   The writing process includes a validation step to prevent you from writing an invalid license key.

Audio

Lip sync problems

Problem 1

During normal audio processing, the audio and video are out of sync.

Solution

Each audio sample rate converter (SRC) can be configured to automatically track the processing delay of one of the video outputs. To apply the internal audio tracking feature, follow this path: **Audio Setup > Global Audio Config > I/O Delay Config** and then select one of the four or eight **I/O Delay SRCx** parameters.

To synchronize the audio, assign the output video type to the associated audio SRC(s).

The **I/O Delay SRCx** parameters are responsible for compensating the internal video propagation delay such that the audio channels are delayed in correct amount with respect to the chosen video output. Depending on the enabled internal processing options and signal path, the processed video's delay may vary from a few microseconds to several frames. Therefore, the aggregation of video delay is derived at the output as the I/O delay signal to be passed to the audio synchronizer to match the audio-to-video delay automatically.

Figure B-7 on page 309 illustrates how the **I/O Delay** signal is derived in SDI-to-SDI signal processing when some of the processing block(s) are activated. Some of the processing blocks that can be applied to the signal include SD ARC, noise reduction, and user fixed delay.

Due to the flexibility of the M-Path mode, the default setting for the **I/O Delay SRCx** parameters is **None** and this selection sets the X85/X75 in **Delay Only** mode. When any one of the **I/O Delay SRCx** parameters is set to track certain output video, the **Autotrack LED** on the control panel is lit.

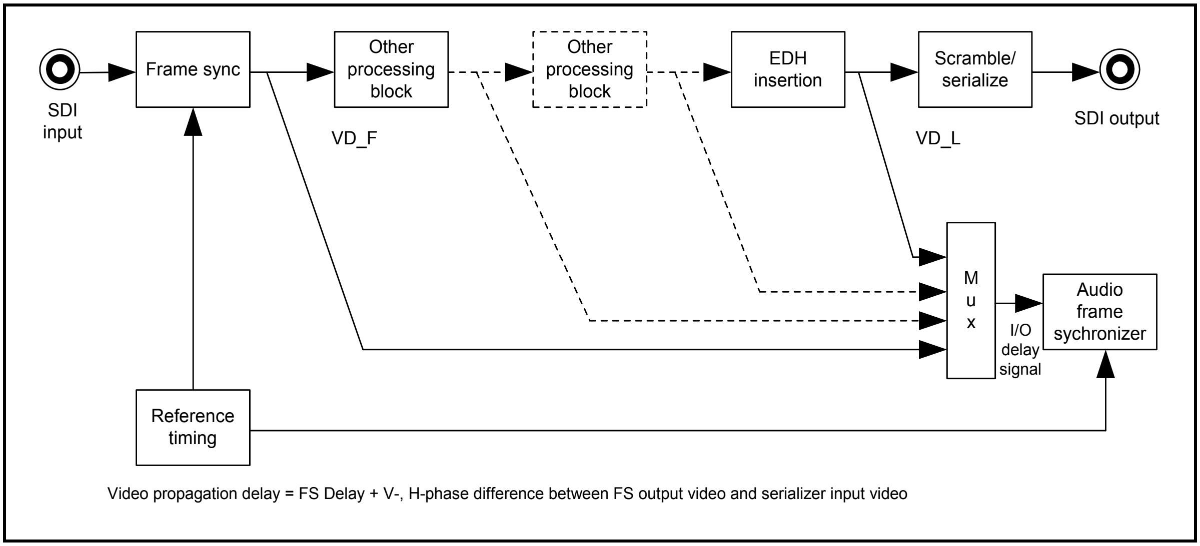


Figure B-7. I/O Delay Signal

Problem 2

When passing the compressed audio via the AES input or embedded paths, the audio and video are out of sync.

Solution

A proper system configuration must be created. If the X85/X75 is set to run in **External** reference lock mode (**Reference Setup** > **Genlock Lock Source**), and the reference signal is applied, the source signal (including the audio) also must be locked to the same reference. Otherwise, the X85/X75's internal frame sync will repeat or drop the video frame as the input and output clocks drift from each other. This will affect the lip sync over periods of time. Also, if the source device driving the X85/X75 has an internal frame sync, it may cause pops or clicks on the downstream device as it drops or repeat frames.

If the source cannot be locked, the X85/X75 must run in delay mode. This is done by selecting **Genlock Lock Source** as the current video input.

Application Example

This example describes how to set up a **Delay** mode operation.

The X85/X75 takes a 1080i or 720p HD signal with embedded audio that is compressed, and at the output, provides fixed 720p with embedded audio. It is assumed that the Dolby embedded audio is present in one of the AES channels in group1's audio space. The X85/X75 is set up in delay mode, locking to HD video input. Thus, the synchronization of video and audio is not possible. However, you *can* activate the video **ProcAmp** function, making it possible to adjust video levels, video delay, audio delay, and other parameters.

X85 (to sync audio with SDI 2)

- **Video Setup > SDI 2 Input > SDI 2 Input Std Select > Auto**
- **Video Setup > Routing Setup > All Out Sel > SDI 2**
- **Video Setup > Digital Output > SDI 2 Out Std Select > 720p/59.94**
- **Reference Setup > Genlock Lock Source > SDI 2**
- **Audio Setup > Routing > Audio In Src Select > SDI**
- **Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > SDI 2 Out**
- **Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > SDI 2 Out**

X75 (to sync audio with HD)

- **Video Setup > HD Input > HD Input Std Select > Auto**
- **Video Setup > Routing Setup > All Out Sel > HD1**
- **Video Setup > Digital Output > HD Out > HD Out Std Select > 720p/59.94**
- **Reference Setup > Genlock Lock Source > HD**
- **Audio Setup > Routing > Audio In Src Select > HD**
- **Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > HD Out**
- **Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > HD Out**

If the lip sync problem still occurs, decode the compressed audio to the baseband using the internal plug-in Dolby decoder module in the X85/X75 and then re-encode again.

Not passing the embedded audio

Without the optional audio submodule, the SD-SDI with embedded audio will pass through the SD-SDI output. The HD-SDI signal with the embedded audio will not pass through the HD-SDI output.

When the video frame sync repeats or drops a frame, or if there is a hot-switch, there will be a disturbance in the embedded audio data stream. This occurs with any video frame sync that passes embedded audio with no embedded audio processing.

Using Older Software

X75 models using older software versions may have problems passing embedded audio in the following situations:

- If the X75SD unit has no audio submodule installed, the default factory setting will not allow the audio to pass. To change this setting, follow:
  Video Setup > Processing > SD TSG & Slide > Keyer TSG Insert > None
- If the unit has software version 1.6.100 and below, when the frame is rebooted or the **Video Input** source is switched, the **Keyer TSG Insert** parameter follows the selected input video source. In order to pass the embedded audio again, this parameter must be set to **None** again.

Analog input audio control menu not showing up

Problem

The menus on the VFD appear to be functioning normally, but the **Analog Input Audio** control menu does *not* appear, or it seems to appear randomly.

Solution 1

If the appearance of the **Analog Input Audio** menu is random, the software version of the unit is 1.4 and therefore, an upgrade to version 1.5 or greater is required.

Visit the software downloads section of the Harris broadcast website, and then download the latest version of the software. Open up the **Release Notes** file for the update instructions, and then proceed with the firmware upgrade.

Solution 2

The X75OPT-AS-8, -16, or -32 audio submodules, and their interconnecting stacker pins, are not installed correctly. Follow these steps to remove and reinstall the module:

1. Remove the X85/X75 from the rack, and then open the lid.
2. Remove the X75OPT-AS-8, X75OPT-AS-16, or X75OPT-AS-32 submodule from the mainboard.
3. Inspect the stacker pins for proper installation and connection.

   (See "Installing and Removing an Audio Synchronizer Module" on page 339 for more information.)
4. Re-install the submodule and lid.
5. Install the frame back into the rack and verify the presence of the **Analog Input Audio** menu upon power up.

Solution 3

The X75OPT-AS-8, X75OPT-AS-16, or X75OPT-AS-32 submodule may be defective. If another module of the same type is available, swap the module. If the submodule is proven defective, contact Harris Customer Service for an RMA number, and then return the module to Harris.

Alarms

Major and Minor Alarms are on

Problem

When the unit is powered up, all or many of the **Alarm** LEDs and network alarms are activated.

Solution 1

The X85/X75 monitors all video and audio inputs, fans, and power supplies. When it detects failure conditions, it activates alarms because the factory default is set to monitor *all* alarms. You can globally disable all of the alarms, or manually enable only those that you want to monitor.

To globally disable all of the alarms in the control panel and in the X85/X75 Web browser, follow this path:

System Config > Alarm Assert Setup > Enable All Alarms and then select **Disable**.

Solution 2

You can choose to disable specific alarms, while leaving others activated.

To configure and activate only the alarms that you wish to monitor, using the control panel, follow these steps:

1. Press the **Option** button and then select the **Configure Alarms** menu.
2. Select the desired alarm parameter by pressing the **Enter** button.
3. Within this parameter menu, configure the alarm appropriately.

To configure and activate only the alarms that you wish to monitor, using the Web Browser, follow these steps:

1. Open up your Internet browser.
2. Type the IP Address of the X75 frame on the **Address** field (see Figure B-8).

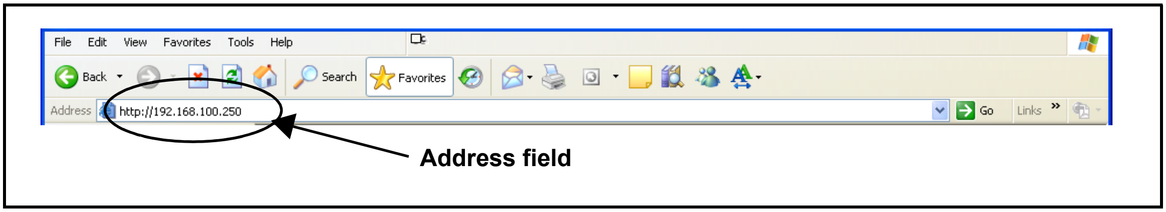


Figure B-8. IP Address Insertion to Access X85/X75 Alarms

3. From the Main web page, select the **Monitoring** hyperlink.
4. Select the **Configure Alarms** hyperlink.
5. Press the **Edit** button corresponding to the alarm that you wish to enable and configure it.

Softkey Installation

Can't activate softkeys

To activate software options that you have purchased (including Dolby decoding) you must enter a softkey code into the License Key menu. The code, consisting of fourteen hexadecimal digits, will be provided when you purchase the option. Enter the softkey using either an X85/X75 control panel, the X85/X75 Web browser , or a CCS software application. (The valid key character sets are numbers 2~9 and letters A~Z.)

To enter a softkey number using the control panel, follow these steps:

1. Select **System Config > Setup > License Key**.
2. Use the control knob and the **Enter** button to enter the characters.
3. Press the **Exit** button when completed.

To enter the softkey number using the Web Browser, follow these steps:

1. Type the IP address of the X85/X75 unit you are upgrading into the **Address** field of your browser (Figure B-9).

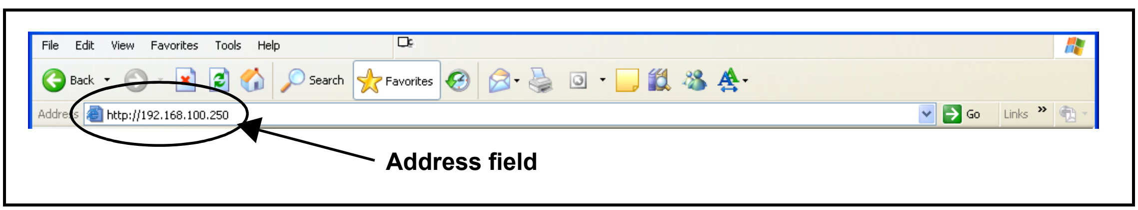


Figure B-9. IP Address Insertion to Add X75OPT-HDDUOCON Option

2. Navigate to **System Config > Setup > License Key**.
3. Type in the supplied softkey codes.

   The upgrade will now take effect.

To enter the softkey number using a CCS software application, follow these steps:

1. With your X85/X75 unit selected in Pilot or Navigator, click the **Device** tab in the **Configuration** window.
2. Type your license key in the **License Key** field.

3. Click the **Write and Reboot** button.

   The writing process includes a validation step to prevent you from writing an invalid license key.

There is a different procedure for installing free firmware upgrades that appear on our website. See “Appendix D: Software” on page 393 for details.

Flash Memory

Flash memory is locked

Problem

The firmware update process was interrupted either by turning off the unit or breaking from the PC during the file transfer. The flash memory is now locked up.

Solution

A manual unlock procedure is required. Follow these steps to unlock the flash memory:

1. Push both **Def IP** and **F.S.** (Fail-safe) DIP switches at the back of the X85/X75 unit to the down position, and then re-power the unit (see Figure B-10).

   (This action sets the unit with the default IP of `192.168.100.250` and opens the FTP port for the file transfer.)

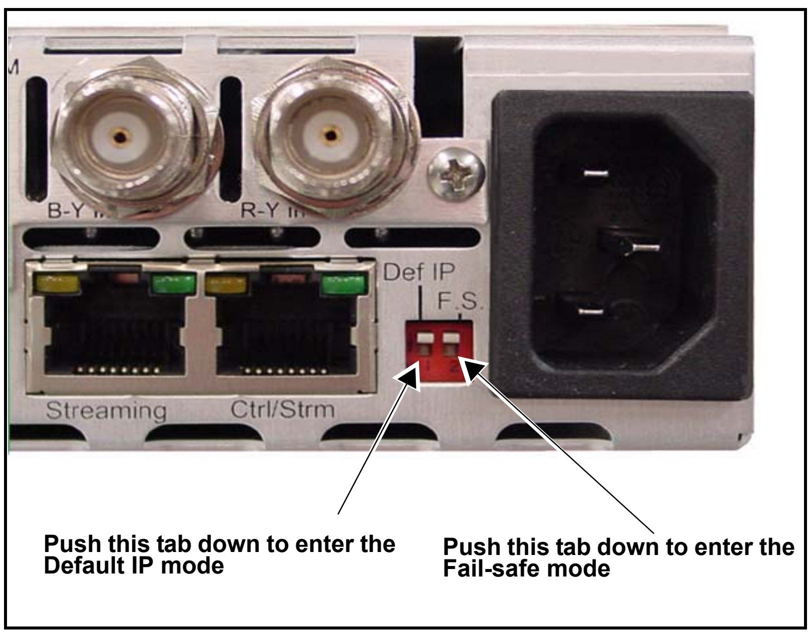


Figure B-10. Location of Def IP and FS DIP Switches

2. Configure your PC's network setting to be on the same static network, using the network addresses shown in Table B-2.

Table B-2. Network Addresses for Default IP and Fail-safe Modes

Network Settings	X85/X75 Unit	PC
IP Address	192.168.100.250	192.168.100.2
Subnet	255.255.255.0	255.255.255.0
Gateway	192.168.100.1	192.168.100.1

3. Connect a cross-over Ethernet cable between the X85/X75 and the PC directly, or a straight Ethernet cable when the PC and X85/X75 are on a network hub or a switch.
4. Ping `192.168.100.250`, and then press the ENTER button on your keyboard.

   If the network connection is valid, the reply messages should be returned.
5. Type the following text: `TELNET 192.168.100.250`, and then press ENTER.
6. Type the following case sensitive login information into the Telnet session:
   a. login: `leitch` and then press ENTER
   b. Password: `LeitchAdmin` and then press ENTER
7. In the Telnet session, follow these steps:
   a. In the .vxWorks shell, type: `m 0x4000000,2`
   and then press ENTER (there is a single space after the letter m).

      You will be prompted with: 0x4000000: xxxx
   b. Type in: `6060`
   and then press ENTER

      You will be prompted with: 0x4000002: xxxx -
   c. Press ENTER.

      You will be prompted with: 0x4000004: xxxx -

d. Type in: `d0d0`
and then press ENTER (Note: These are numeric zeroes)

You will be prompted with: 0x4000006: xxxx -

e. Type in: q
and then press ENTER.

8. Close the **Command Prompt DOS Box** to quit the Telnet session.
9. Obtain the latest version of the release software from the our website, and then follow the instruction to upload the files.
10. When completed, put both the **Def IP** and **F.S.** DIP switches at the back of the X85/X75 to the up position.
11. Reboot the X85/X75.

Upgrading Firmware

Software can’t upload

Problem:

Many attempts were made to update the X85/X75 software, but there are network problems interfering with the procedure.

Solution:

It’s likely that the file system became corrupted. In this case, the frame can be updated by using both the Fail-safe and Default IP switches. (Also see “Problems with Pinging” on page 327.)

Follow these steps to correct the problem:

1. Push both **Def IP** and **F.S.** (Fail-safe) DIP switches at the back of the X85/X75 to the down position, and then re-power the unit (see Figure B-11).

   (This action sets the unit with the default IP of `192.168.100.250` and opens the FTP port for the file transfer.)

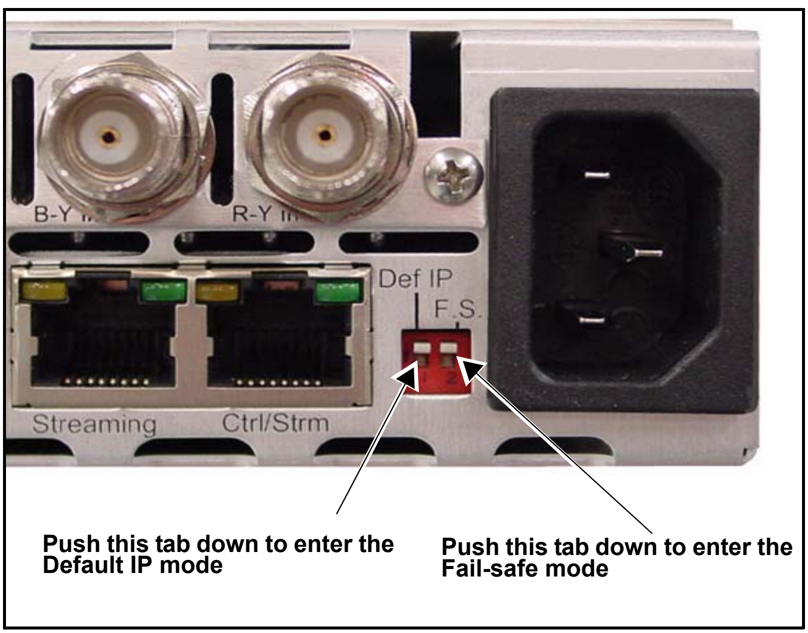


Figure B-11. Location of Def IP and FS DIP Switches

2. Configure your PC's network setting to be on the same static network, using the network addresses shown in Table B-3.

Table B-3. Network Addresses for Default IP and Fail-safe Modes

Network Settings	X85/X75 Unit	PC
IP Address	192.168.100.250	192.168.100.2
Subnet	255.255.255.0	255.255.255.0
Gateway	192.168.100.1	192.168.100.1

3. Connect a cross-over Ethernet cable between the X85/X75 and the PC directly, or a straight Ethernet cable when the PC and X85/X75 are on a network hub or a switch.
4. Ping `192.168.100.250`, and then press the ENTER button on your keyboard.

   If the network connection is valid, the reply messages should be returned.
5. Type the following text: `TELNET 192.168.100.250`, and then press ENTER.
6. Type the following case sensitive login information into the Telnet session:
   a. login: `leitch` and then press ENTER
   b. Password: `LeitchAdmin` and then press ENTER
7. In the Telnet session, follow these steps:
   a. In the vxWorks shell, type: `m 0x4000000,2`
   and then press ENTER (there is a single space after the letter m).

      You will be prompted with: 0x4000000: xxxx
   b. Type in: `6060`
   and then press ENTER

      You will be prompted with: 0x4000002: xxxx -
   c. Press ENTER.

      You will be prompted with: 0x4000004: xxxx -

d. Type in: `d0d0`
and then press ENTER (Note: These are numeric zeroes)

You will be prompted with: 0x4000006: xxxx -

e. Type in: q
and then press ENTER.

8. Close the **Command Prompt DOS Box** to quit the Telnet session.
9. Obtain the latest version of the release software from our website, and then follow the instruction to upload the files.
10. When completed, put both the **Def IP** and **F.S.** DIP switches at the back of the X85/X75 to the up position.
11. Reboot the X85/X75.

RCP is not booting up properly after upgrade

Problem:

An X85/X75 batch file was accidently uploaded to an X85/X75-RCP. Now the Remote Control Panel is not booting up properly. The VFD screen appears “dead” and none of the buttons and LEDs are lit.

Solution:

It is likely that the remote control panel is in fail-safe mode, with the factory default IP Address of 192.168.100.251. (Holding down the **Bypass** button for 3 seconds on power reboot forces the RCP into the manual fail-safe mode.)

Follow the instructions below to restart the RCP:

1. Configure your PC's network setting to be on the same static network, using the network addresses shown in Table B-4.

Table B-4. Network Addresses for Default IP and Fail-safe Modes

Network Settings	X85/X75 Unit	PC
IP Address	192.168.100.250	192.168.100.2
Subnet	255.255.255.0	255.255.255.0
Gateway	192.168.100.1	192.168.100.1

2. Connect a cross-over Ethernet cable between the X85/X75 and the PC directly, or a straight Ethernet cable when the PC and X85/X75 are on a network hub or a switch.
3. Ping `192.169.100.250`, and then press the ENTER button on your keyboard.

   If the network connection is valid, the reply messages should be returned.
4. If you receive successful replies, continue with step 4; otherwise, troubleshoot the networking connectivity.
5. Download and unzip the latest X75-RCP files to a directory such as C:\X75RCP.

6. Go to the directory where the RCP files are extracted.

   Note: This assumes you had downloaded and unzipped the latest X85/X75 files to C:\X75RCP directory. For example:

   `CD \X75RCP <ENTER >`

7. Within this directory, type the following:

   `x75rcp 192.168.100.251`, and then press ENTER.

8. Reboot the panel.

(Note: When the RCP files are restored properly, the RCP's IP Address will go back to its original address.)

Software file updated incorrectly or became corrupted

During a firmware upgrade, if your files become corrupted, you can put the system into a fail-safe mode. To enter the fail-safe mode and upgrade your firmware, follow these steps:

1. Ensure your X85/X75 is either connected to the network using a 10/100Base-T straight-through Ethernet cable or is directly connected to a PC using a cross-over cable.
1. Push down the **F.S.** DIP switch on the back of the X85/X75 unit (see Figure B-12).

   All programs and current activity will cease, except for the capability to upload new software via FTP.

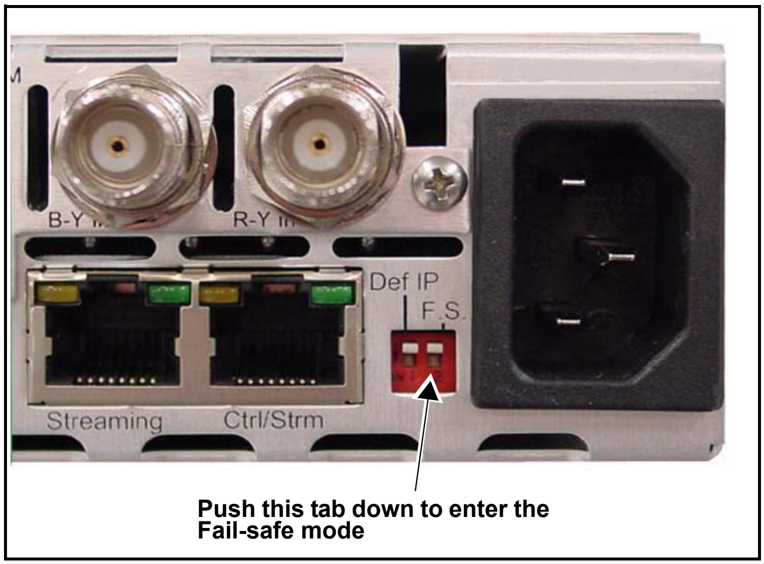


Figure B-12. Location of the F.S. (Fail-safe) DIP Switch

2. Push down the **F.S**. DIP switch on the back of the unit to put the X85/X75 system into Fail-Safe mode.
3. Launch CCS Pilot or Navigator on the remotely or directly connected PC.
4. Follow the procedure in your CCS user manual or online help system for “Updating the Software on a CCS Device.”

5. Return the **F.S.** DIP switch to the up position, and then reboot your system.

NOTE

After rebooting, the network address settings of the X85/X75 should have been retained. If not, navigate to **System Config > Setup**, and then change or validate the settings. Ensure that you select **Save IP**.

Problems with Pinging

If you have difficulty communicating with your X85/X75, and are unable to ping it successfully, one of the following simple problems may be the cause:

- The X85/X75 is not powered up.
- The Ethernet cabling between your PC, the X85/X75, and other network devices (hubs, switches, routers) is not set up properly.
- You are using the wrong type of network cable (straight-through vs. crossover).
- You connected to the wrong Ethernet port on the back of your PC.
- The network cable was connected to the **Streaming** port of the X85/X75.
- The PC network settings and the X85/X75 network settings don’t have matching subnets and/or belong to different subnets with no proper gateway linking the two networks together.
- The PC and the X85/X75 have the same IP address.
- On the PC, you accidentally changed the network settings on the wrong LAN card.

Appendix C

Servicing

Overview

This appendix includes the following information and procedures:

Safety Precautions

Only qualified personnel should perform service procedures. Refer to the *X85-3G/X85HD/X75SD Product Safety Instructions* booklet before servicing the X85/X75 or its components.

Laser Caution

This product may contain lasers! Heed the following caution:

Laser Radiation When Open

CAUTION: To avoid damage from laser radiation, do not remove or displace any connections or protective panels. Do not attempt to modify or adjust the laser circuitry. Contact Harris to return the laser sub-module if it is not working satisfactorily.

CLASS 1 LASER PRODUCT

[Finland] LUOKAN 1 LASERLAITE.
[Sweden] KLASS 1 LASER APPARAT.

CLASS 1
LASER PRODUCT

ESD Caution

When servicing the X85-3G/X85HD/X75SD and its components, take the proper precautions to avoid electrostatic discharge (ESD).

Preventing Electrostatic Discharge

CAUTION: Electrostatic discharge (ESD) can damage components in the product. To prevent ESD, observe these precautions when directed:

- **Use a ground strap.** Wear a grounded wrist strap to discharge the static voltage from your body while installing or removing sensitive components.
- **Use a safe work area.** Do not use any devices capable of generating or holding a static charge in the work area where you install or remove sensitive components. Avoid handling sensitive components in areas that have a floor or benchtop surface capable of generating a static charge.
- **Handle components carefully.** Do not slide sensitive components over any surface. Do not touch exposed connector pins. Handle sensitive components as little as possible.
- **Transport and store carefully.** Transport and store sensitive components in a static-protected bag or container.

Understanding and Working With Fiber Optics

Input and output modules using optical fibre transmitters and receivers were developed in response to a growing demand for a flexible method of transporting very high speed digital video and audio over long distances.

Fiber optic technology offers many benefits over copper wire systems:

- Longer distance capability
- Higher bandwidth
- Better signal quality
- Immunity from EM radiation and lightning
- Advantage of being lightweight
- Ability to be easily upgraded

Basic Principles

Fiber optic technology can be explained using these two concepts:

- Light is transmitted over optical fiber by reflecting it within a long "cylindrical mirror."
- The mirrored surface occurs at the core cladding interface. By sending on/off bursts of light within the optical fiber, light can be guided along varying paths.

See Figure C-1 and Table C-1 on page 332 for further explanation.

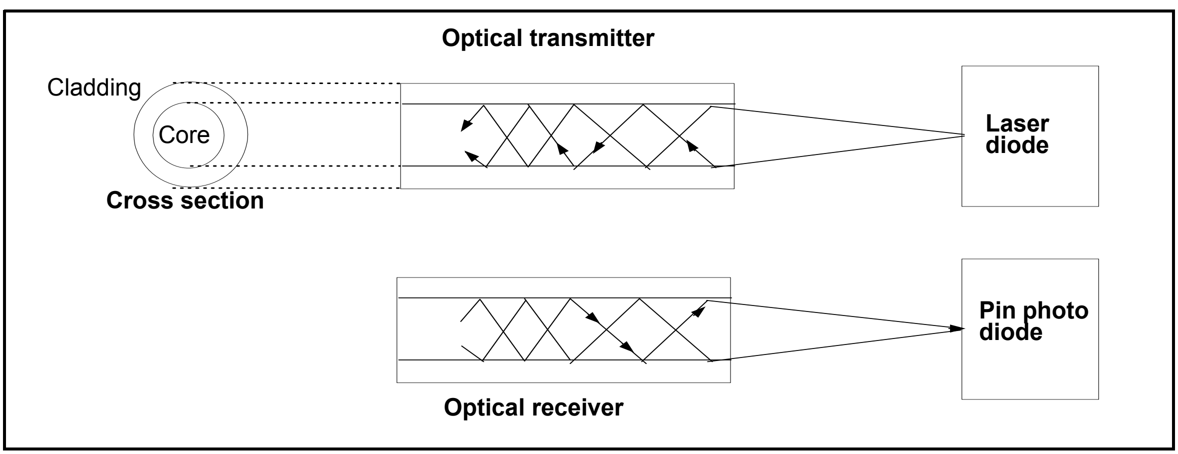


Figure C-1. Fiber Optic Transmitting and Receiving

Table C-1. Function and Description of Fiber Optic Components

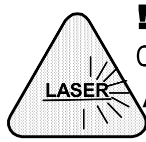
Item	Function	Composition
Optical transmitter	Converts a data signal into an equivalent optical power waveform and couples it into an optical fiber.	• Laser diode • Laser diode driver The role of the driver is to bias the laser. Some laser drivers contain circuitry to control power and temperature.
Optical receiver	Converts the incoming optical power signal into an output data signal.	• PIN photo diode • Transimpedance amplifier • Decision circuitry The receiver circuitry provides standard ECL outputs based on the input voltage.

Handling and Connecting Fibers

Class 1 Laser Products

The X75OPT-HDUPG and the X85OPT-HDUPG module are CLASS 1 laser products.

Avoid looking directly at a laser. Laser radiation is invisible and can cause serious eye damage.



!DANGER!

Class 1 Laser Product

Avoid Direct Exposure

Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

NOTE

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED IN THIS MANUAL MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

General Precautions

Please take the following precautions when working with fiber optics:

- Never touch the end face of an optical fiber.
- Do not place optical fibers under heavy objects.
- Transmission characteristics of the fiber are dependent on the shape of the optical core; therefore, care must be taken to prevent fiber compression.
- Avoid abrupt fiber bending.

  A suggested minimum bending radius is 1.2 in. (3 cm). Bending radii smaller than this can lead to fiber bending loss which will decrease the maximum attainable link length by decreasing the available power budget.
- Make fiber interconnections very secure.
- Clean fiber *every time* that it is mated or unmated. (See "Cleaning Optical Fibers" below.)

  As dust particles on the ends of the optical fiber can add up to 1 dB of loss, it is important to clean them regularly. Larger dust particles can totally obscure light altogether.
- Cover a fiber *immediately* when unmated.

  Most fiber manufacturers provide a plastic boot that fits over the ferrule body for this purpose.
- Remove dust particles from the housing assembly with a blast of dry air when using interconnection housing to mate two optical fibres.

NOTE

The X75OPT-HDUPG module is supplied with an SC interconnection housing built into the module. With this style of connector, the fiber assembly and the housing assembly can only be connected in one way and with very good repeatability. The optical fiber with SC connectors must be supplied by the customer.

X85OPT-HDUPG modules use LC fiber connectors.

Cleaning Optical Fibers

Required Cleaning Equipment

Optical fibers must always be cleaned before mating and after unmating. You will need the following items:

- “Kimwipes” or a lens-grade, lint-free tissue
- Denatured alcohol
- Canned dry air (optional, instead of wiping with alcohol)

Cleaning Technique

Use the following method to clean the fibers:

1. Fold the tissue twice so that it is four layers thick.
2. Saturate the tissue with alcohol.
3. Clean the sides of the connector ferrule.
    i. Place the connector ferrule in the tissue and apply pressure to the sides of the ferrule.
    ii. Rotate the ferrule several times to remove all contamination from the ferrule sides.
4. Clean the end of the connector ferrule.
    i. Move to a clean part of the tissue.
    ii. Be sure it is still saturated with alcohol and that it is still four layers thick.
    iii. Put the tissue against the end of the connector ferrule.
    iv. Place your finger against the tissue so that it is directly over the ferrule.
    v. Rotate the end of the connector.
5. Mate the connector immediately. Do not let the connector lie unattended before mating.

Preparing the X75 or X85 for Servicing

Some versions of X85/X75 units use a two-part chassis cover, making it possible for you to perform maintenance on power supplies without removing the frame from the rack. Other versions use a full-size cover. Follow these steps to remove either version:

1. Read and heed the safety precautions outlined in the X85-3G/X85HD/X75SD safety manual, and in the section “Safety Precautions” on page 330.
2. Confirm that the power cord is disconnected from the rear panel.
3. Use a Phillips screwdriver to remove the retaining screws on the chassis cover and then lift the cover off. Figure C-2 shows the location of the screws along the back edge, front edge, top, and each side of the frame.

   Keep the screws, as they will be needed to replace the top cover.

CAUTION

With the power cord disconnected, the unit is no longer grounded. Be aware of potential damage from static electricity.

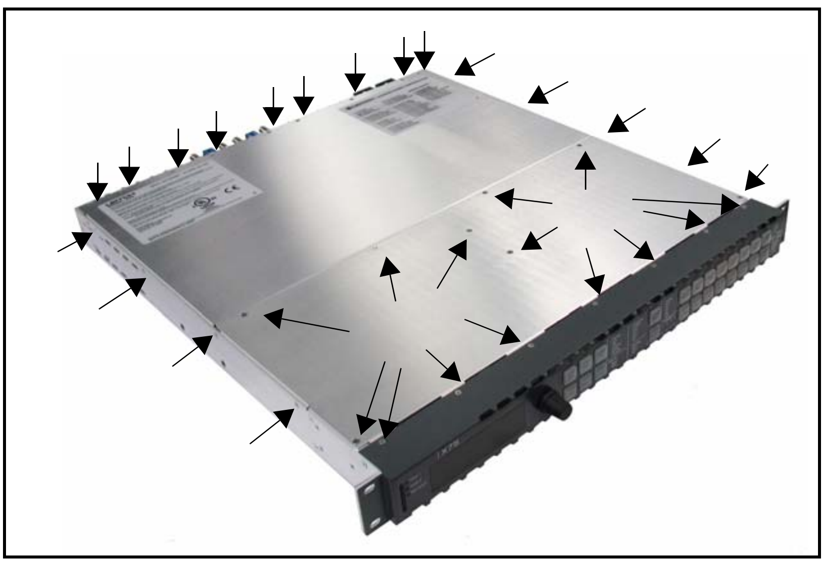


Figure C-2. Location of Chassis Cover Screws

Common Replacement Part Numbers

The following parts are the most commonly ordered as replacements.

Table C-2. Common Replacement Part Numbers

Part Number	Part Identification
122-000024-00	Power supply
131-000014-00	Fan
159-000282-00	Rubber keymat
134-000212-00	Board stacker 2x15 pin
134-000228-00	Single 2x7 analog audio connector
170-000483-00	X75 Whole local control panel assembly
X75SPR-KIT	Package that includes the following parts: • 2 fans • 4 stackers • 1 power supply with no connectors • 1 shaft encoder
X75OPT-LCP and X85OPT-LCP	Front control panel kits

Installing the Software Keys

If you have ordered a software option separately, you will require a soft keycode. This unlock code, consisting of fourteen hexadecimal digits, will be provided when you purchase the option. Once you install the option, use a control panel or the web client server software to install the code.

Using the control panel or web server application, follow this thread to install the unlock code: **System Config > Setup > License Key**.

Installing a Frame-Mounted Local Control Panel

The X85OPT-LCP and X75OPT-LCP field retrofit kits make it possible to remove a blank front module from an X85 or X75 unit, and replace it with a local control panel. The new control panel in the retrofit kit includes a fan module. (You will not need to retain the fan module from the blank front panel.)

CAUTION

To prevent damage to the control panel, you must unplug the X85 or X75 before beginning the installation.

Follow these steps to remove a blank front panel and replace it with a local control panel retrofit:

1. Remove all power from the X85/X75.
2. Remove the mounting ear screws that secure the X85/X75 to the rack, and then slide the unit forward.
3. Remove the seven screws along the top of the blank front panel that hold the panel to the frame.

   Retain the screws.
4. Remove the seven screws along the bottom of the blank front panel that hold the panel to the frame (do *not* remove the line of four screws that secure the fan module). See Figure C-3 below.

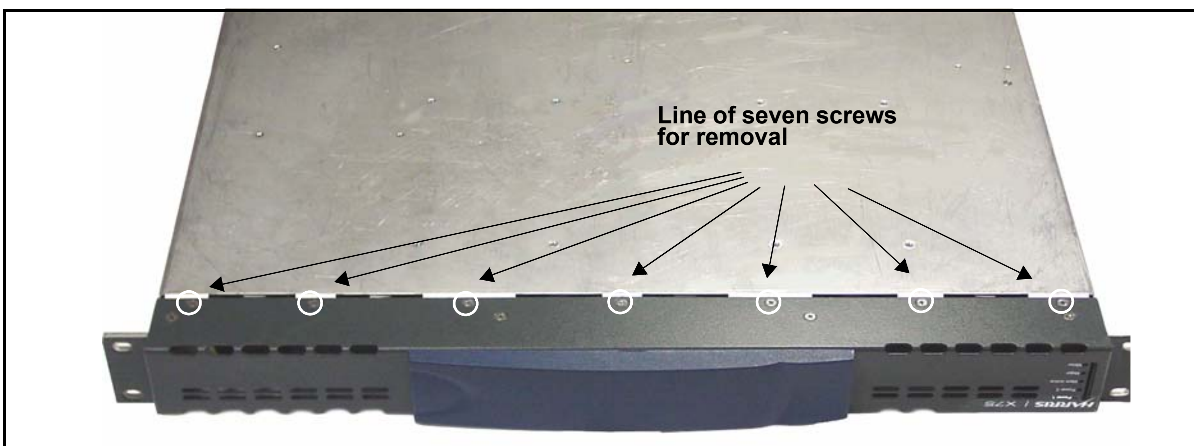


Figure C-3. Removing the Bottom Front Panel Screws

5. Pull the blank front panel from the unit.
6. Carefully insert the new front panel, ensuring that you align the connector pins located behind the VFD.
7. Replace the screws on the bottom and top of the unit.
8. Reconnect all cabling, and restore power.

Installing and Removing an Audio Synchronizer Module

Installing a New Module

If you have ordered an audio synchronizer module separately to upgrade your system, follow the installation steps listed below.

CAUTION

This module is not hot-swappable. To prevent damage, ensure that the power to the X85 or X75 is off before inserting or removing the module.

1. Remove the chassis cover (see "Preparing the X75 or X85 for Servicing" on page 335).
2. Remove and retain the screws from the blank filler plate on the rear panel where the new audio synchronizer module is to be installed, and then remove the plate.
3. Remove the packaging from the audio synchronizer module.

   The package includes one board, four stackers, and the required number of standoff screws.
4. Turn the module upside down and insert the four stackers into the corresponding connectors on the board (Figure C-4).

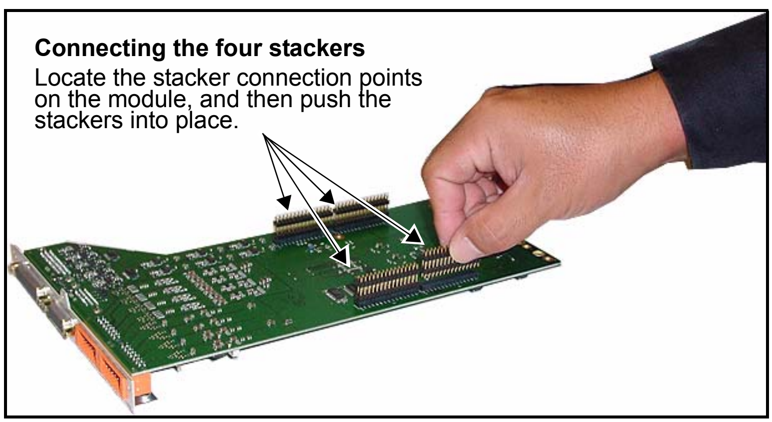


Figure C-4. Connecting Four Stackers to Module

5. Return the module to its upright position, and then align it with the installed standoffs on the main board.

   There are two standoffs on the back of the main board, and one in the middle. To assist with alignment, the standoff in the back left corner is higher than the others in order. See Figure C-5 and Figure C-6.

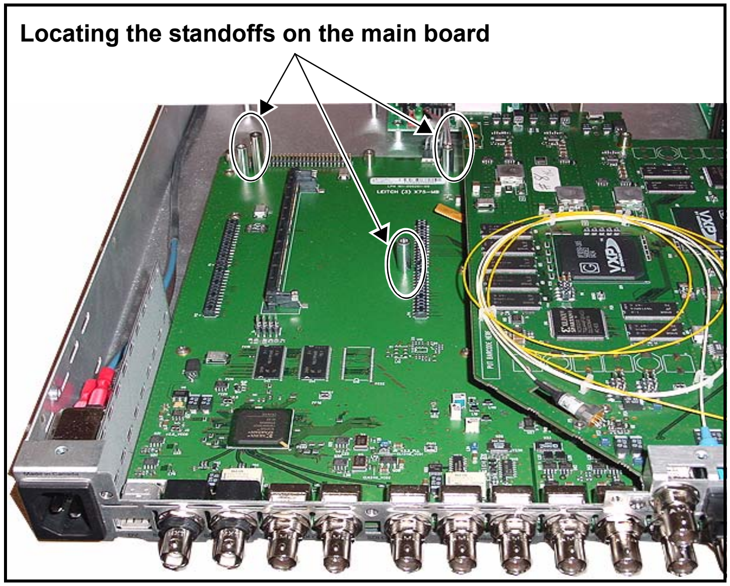


Figure C-5. Locating Main Board Standoffs

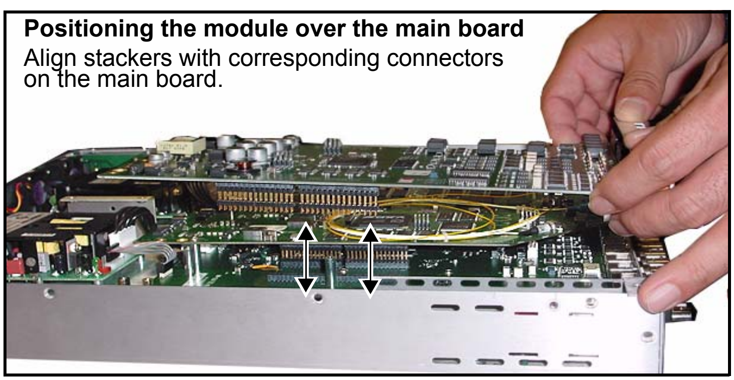


Figure C-6. Positioning Module over Standoffs

6. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push the board gently over the main board stacker connection points until they lock into place.

   Figure C-7 illustrates the area of the module you should push so that the stackers lock firmly into place.

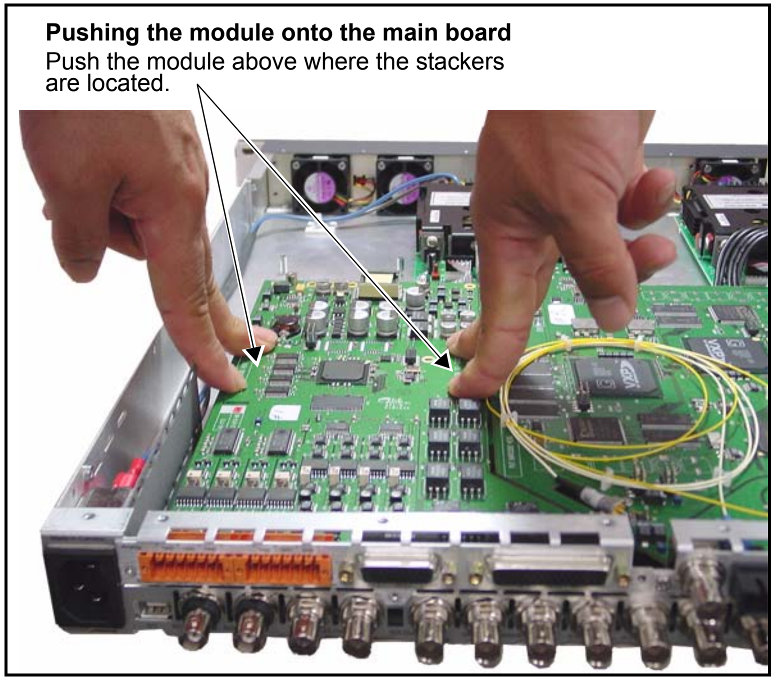


Figure C-7. Pushing the Module on to the Main Board

7. Secure the new module to the main board using the provided screws.

   Figure C-8 on page 342 illustrates the location of the three module standoffs where you need to apply the screws.

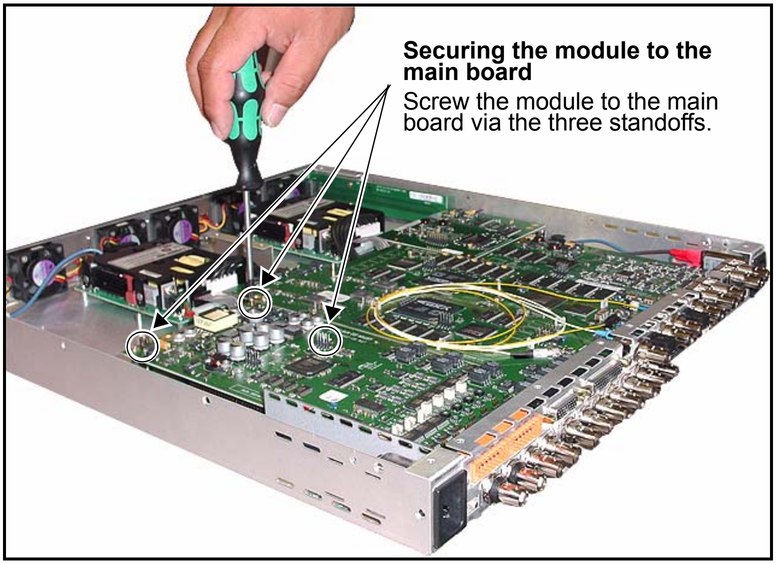


Figure C-8. Securing the Module to the Main Board

8. Screw the back panel into place using the screws removed in step 2.

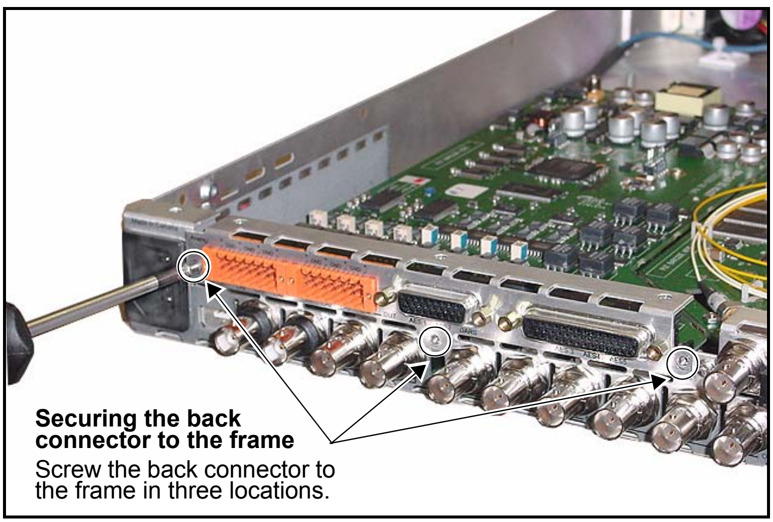


Figure C-9. Securing the Back Connector to the Frame

9. Replace the chassis cover using the original screws. See page 335 for more information on replacing the cover.

Removing an Existing Module

If you must remove an existing audio synchronizer module from a unit, follow these steps:

1. Remove the screws along the back edge and each side of the X85/X75's chassis cover (see Figure C-2 on page 335), and then slide the cover off.

   Retain the screws for later use.
2. Remove the three rear connector screws that secure the module to the frame.

   See Figure C-9 on page 342 to locate these screws.
3. Remove the three screws that secure the module to the main board.

   See Figure C-8 on page 342 to locate these screws.
4. Gently lift the module off of the main board.

   Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.
5. Inspect the connectors on the module and main board to ensure that all pins are straight.
6. Store the board in a protective bag to protect it from damage or ESD.

Installing and Removing an X75OPT-HDUPG HDTV Module

Installing a New Module

If you have ordered a replacement or spare X75 HDTV module, follow the installation steps listed below. These steps are different from those used to install an X85 HDTV module. See page 349 for details on the X85 procedure.

CAUTION

This module is not hot-swappable. To prevent damage, ensure that the power to the X75 is off before inserting or removing the module.

1. Remove the chassis cover (see "Preparing the X75 or X85 for Servicing" on page 335).
2. Remove the screws from the blank filler plate on the rear panel where the new fiber connector module is to be installed, and then remove the plate.

   Retain the screws for later use.
3. Remove the packaging from the connector module.
4. Turn the board upside down and insert the seven stackers into the corresponding connectors on the underside. See Figure C-10.

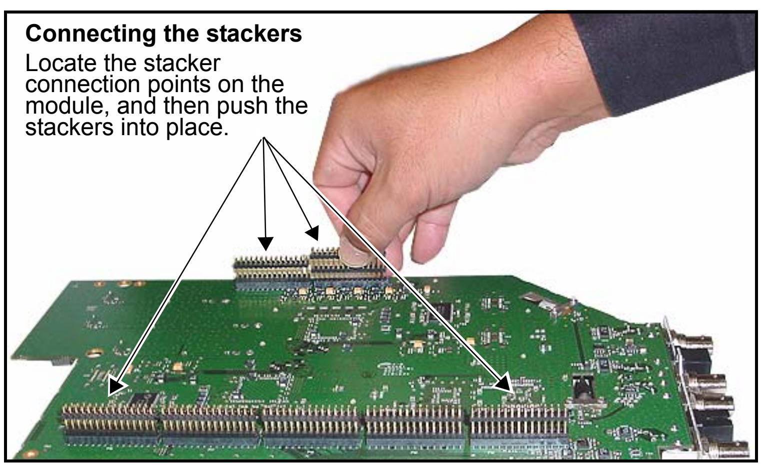


Figure C-10. Connecting Seven Stackers to Module

5. Return the module to its upright position, and then align it with the installed standoffs on the main board.

   There are three standoffs on the back edge of the main board, and one in the middle. The middle standoff along the back edge of the module is higher than the others in order to assist with alignment. See Figure C-11 and Figure C-12.

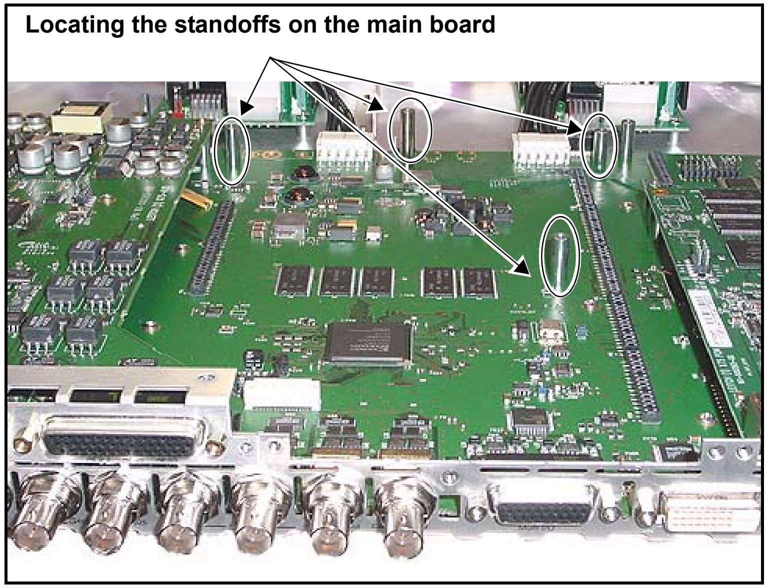


Figure C-11. Locating Main Board Standoffs

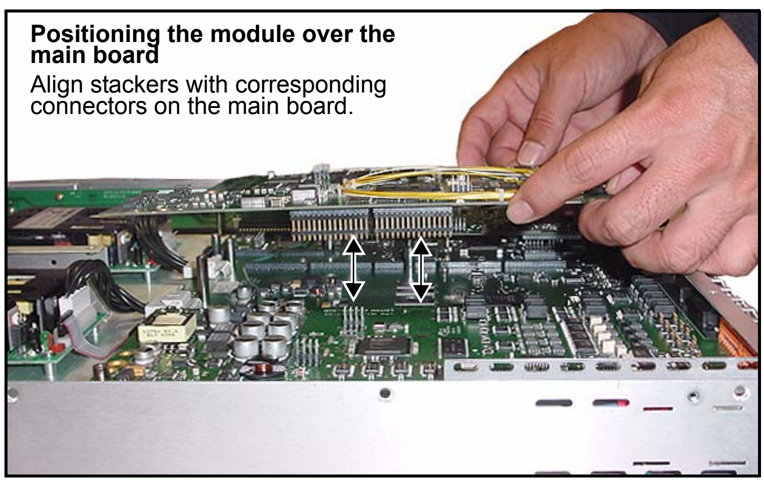


Figure C-12. Positioning Module over Standoffs

6. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push the board gently over the main board stacker connection points until they lock into place.

   Figure C-20 illustrates the area of the module you should push so that the stackers lock firmly into place.

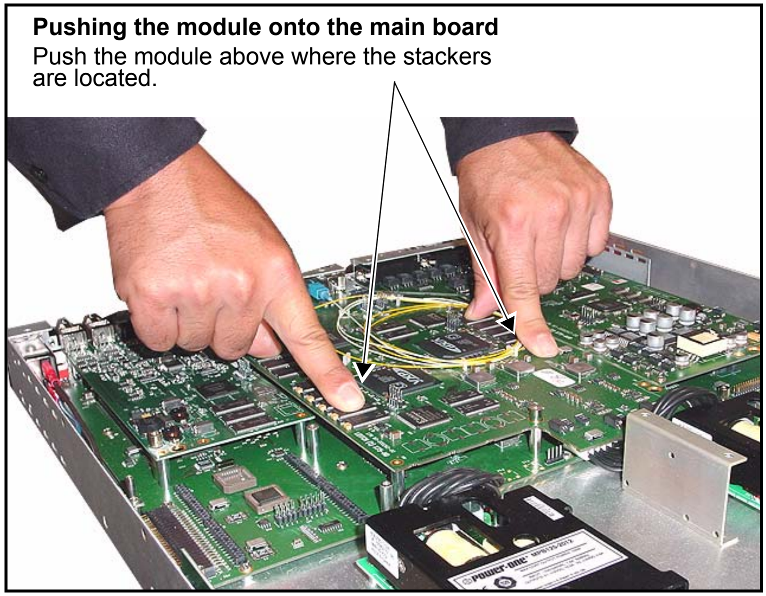


Figure C-13. Pushing the Module on to the Main Board

7. Secure the new module to the main board using the provided screws.

   Figure C-14 on page 347 illustrates the location of the three module standoffs where you need to apply the screws.

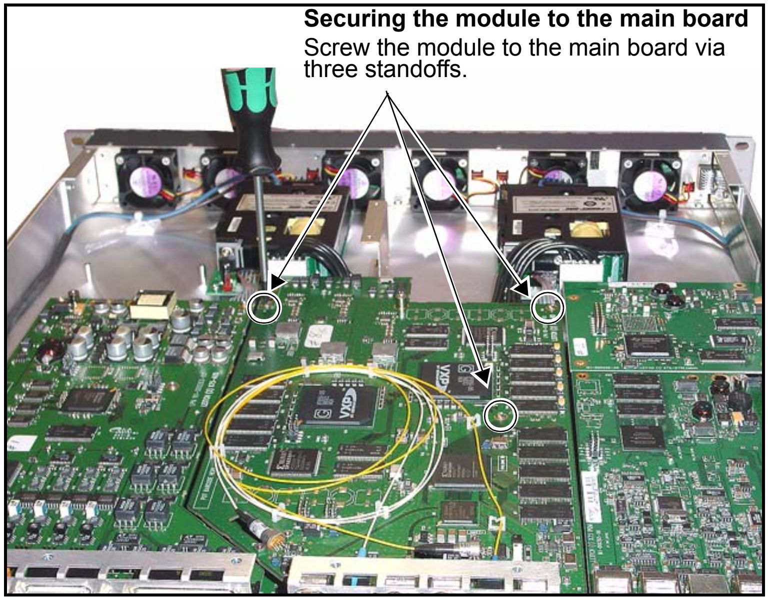


Figure C-14. Securing the Module to the Main Board

8. Screw the back panel into place using the screws removed in step 2.

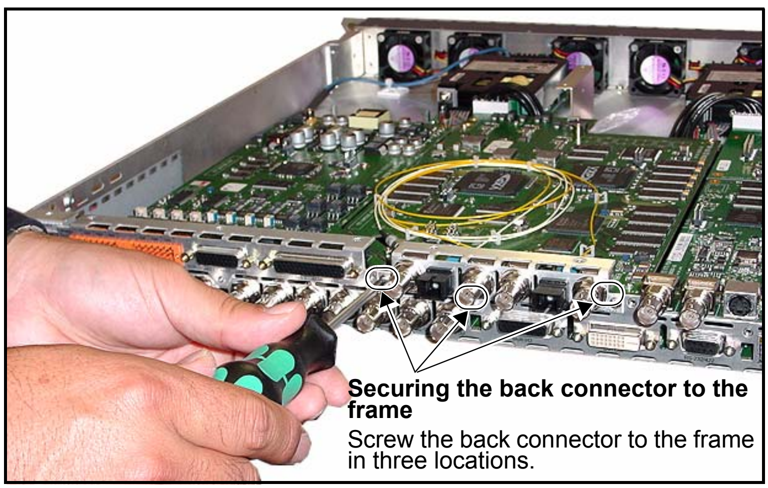


Figure C-15. Securing the Back Connector to the Frame

9. Replace the chassis cover using the original screws. See page 335 for more information on replacing the cover.

Removing an Existing X75 Module

If you must remove an existing HDTV module from an X75, follow these steps:

1. Remove the screws along the back edge and each side of the X75's chassis cover (see Figure C-2 on page 335), and then slide off the cover.

   Retain the screws for later use.

2. Remove the three rear connector screws that secure the module to the frame.

   See Figure C-21 on page 352 to locate these screws.

3. Remove the three screws that secure the module to the main board.

   See Figure C-14 on page 347 to locate these screws.

4. Gently lift the module off the main board.

   Be sure to lift the module evenly to prevent the stacker connector pins from bending or breaking.

5. Inspect the connectors on the module and main board to ensure that all pins are straight.

6. Store the board in a protective bag to protect it from damage or ESD.

Installing and Removing an X85XOPT-HDUPG HDTV Module

Installing a New Module

These instructions describe how to install a new or replacement X85 HDTV module. You will need to install the latest X85 firmware (available from our website) to operate the X85 module. The optional SFP+RR and SFP+TT+13+13L SFP modules are required to make fiber optic connections to the X85HD module (see page 353).

To remove an existing X75HD module, see page 348. See page 355 to remove an existing X85HD module.

CAUTION

This module is not hot-swappable. To prevent damage, ensure that the power to the X75 or X85 is disconnected before inserting or removing the module.

1. Remove the chassis cover (see "Preparing the X75 or X85 for Servicing" on page 335).
2. Insert the supplied stackers onto the main module (Figure C-16).

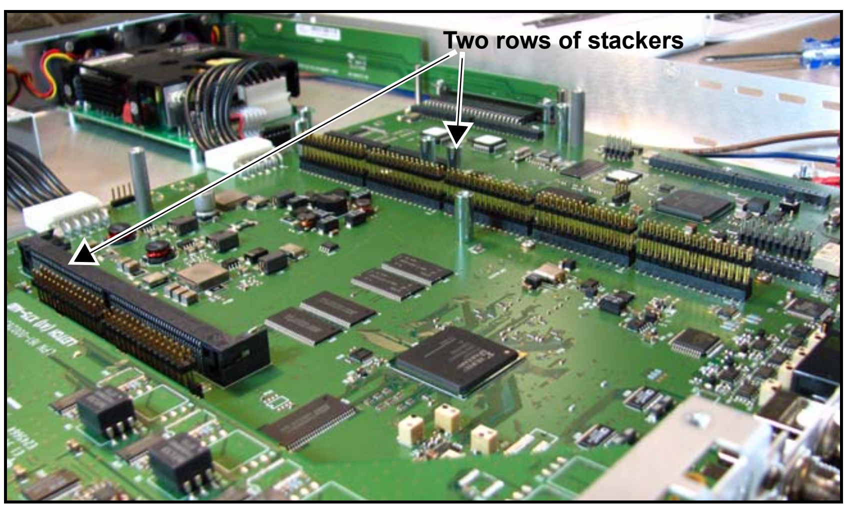


Figure C-16. Stackers on the Main Board

3. Remove the screws from the blank plate or the existing rear connector panel.

   Retain the screws for later use.

4. Remove the packaging from the new X85 module.

5. Position the X85 above the stackers, and then carefully insert the main board alignment pin into the alignment hole at the front of the X85 module (see Figure C-17 and Figure C-18).

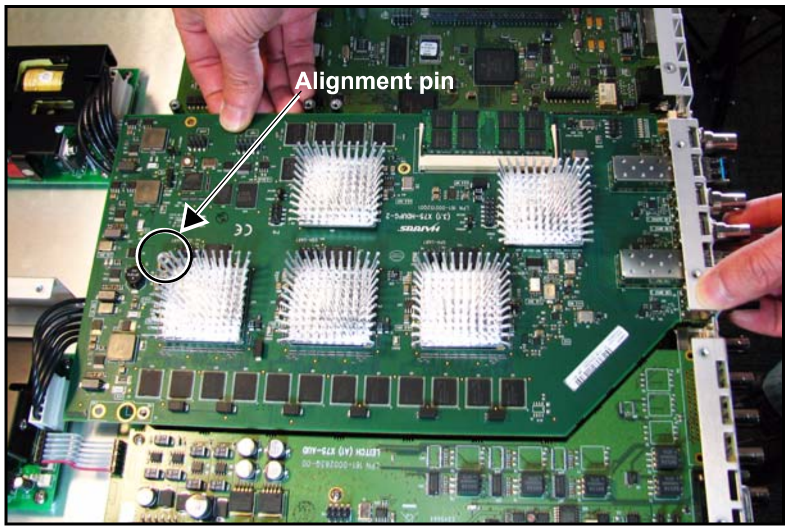


Figure C-17. Positioning the X85 Module

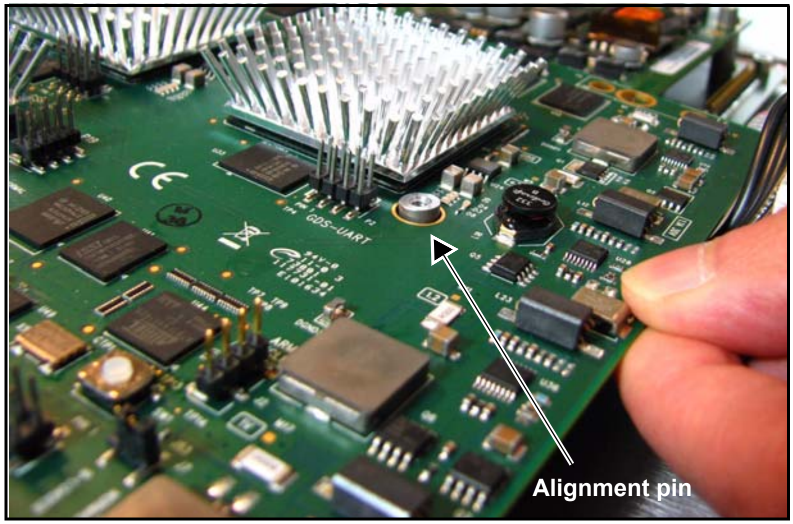


Figure C-18. Alignment Pin for the X85 Module

6. Align the left screw hole in the back panel (Figure C-19).

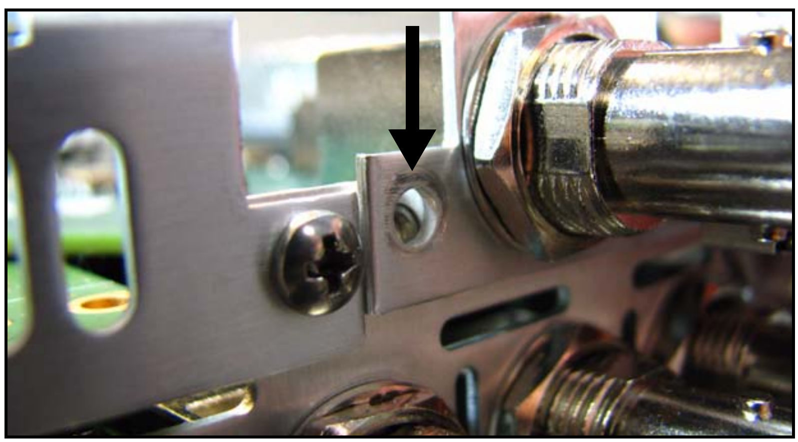


Figure C-19. Aligning the Back Panel

7. Push the X85 module gently over the main board stacker connection points until they lock into place (Figure C-20).

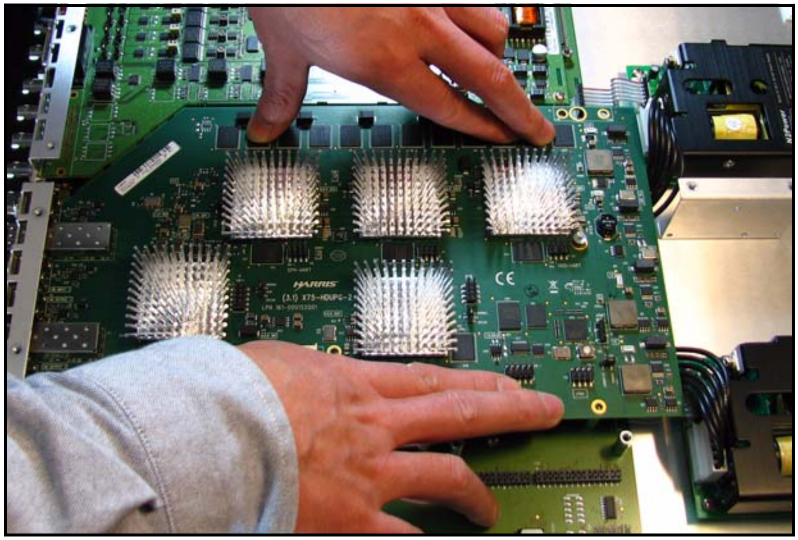


Figure C-20. Pushing the Module Onto the Main Board

8. Secure the new X85 module to the main board using the three screws provided.
9. Screw the back panel into place using the screws removed in step 3.

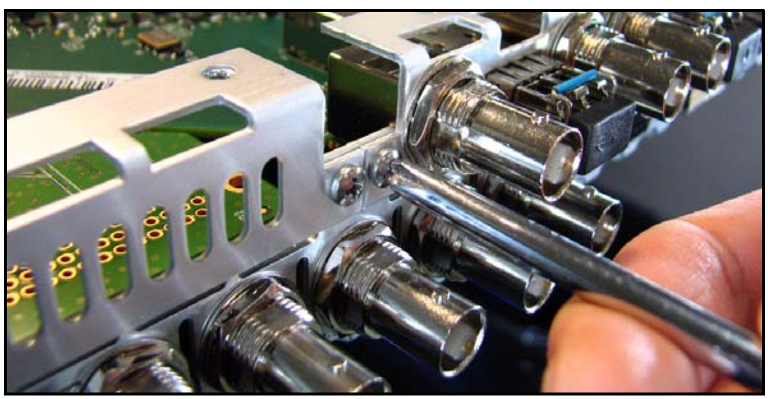


Figure C-21. Securing the Back Connector to the Frame

10. Replace the chassis cover using the original screws.

Optional SFP Receiver and Transmitter Modules

To use the fiber connectors on the X85OPT-HDUPG HDTV module, you will need to install optional SFP modules. The HDTV module is designed to accept one receiver and/or one transmitter SFP module as follows:

- SFP+RR Field Retrofit Fiber Receiver, with dual inputs and standard sensitivity
- SFP+TT+13+13L Field Retrofit Fiber Transmitter with dual outputs and 1310nm FP lasers

To install an SFP module, follow these steps:

1. Remove the protective cap from the fiber connector at the back of the X85HD module.
2. Using a 1.25 mm adapter cleaning stick, wipe the optical connector in the SFP module in the following manner:
    i. Insert the cleaning stick straight into the SFP (the use of FCC2 fluid improves the cleaning performance).
    ii. Apply 1.3 to 1.4 lbs. (600 to 700 g) of pressure to ensure the ferrule is slightly depressed in the sleeve.
    iii. Rotate the cleaning stick four or five times while in direct contact with the ferrule end-face.
    iv. Dispose of the cleaning stick.

NOTE

The cleaning stick is for single-use only. Repeated use may cause damage.

3. Push each SFP module into its correct slot, ensuring the blue handle is down (Figure C-22).



Figure C-22. Inserting the SFP Module

4. Once the SFP module is fully inserted, lift the blue handle up until it snaps into place.

CAUTION

Do not attempt to modify or adjust the laser circuitry. Contact Harris to return the laser sub-module if it is not working satisfactorily.

Removing an X85 Module

If you must remove an X85 HDTV module from a frame, follow these steps:

1. Remove the screws along the back edge and each side of the X75/X85 chassis cover (see Figure C-2 on page 335), and then slide off the cover.

   Retain the screws for later use.

2. Remove the three rear connector screws that secure the module to the frame.
3. Remove the three screws that secure the module to the main board.
4. Gently lift the module off the main board, ensuring that you lift the module evenly to prevent the stacker connector pins from bending or breaking.
5. Inspect the connectors on the module and main board to ensure that all pins are straight.
6. Store the board in a protective bag to protect it from damage or ESD.

Program Delay Memory Module Installation

The program delay memory module (see Figure C-23) is part of the X85OPTPD-2-M2 Program Delay package, and it is installed on the X85XOPT-HDUPG HDTV module. The module must be activated with a license key that is either sold with the package, or is purchased separately (X85OPTPD-2).

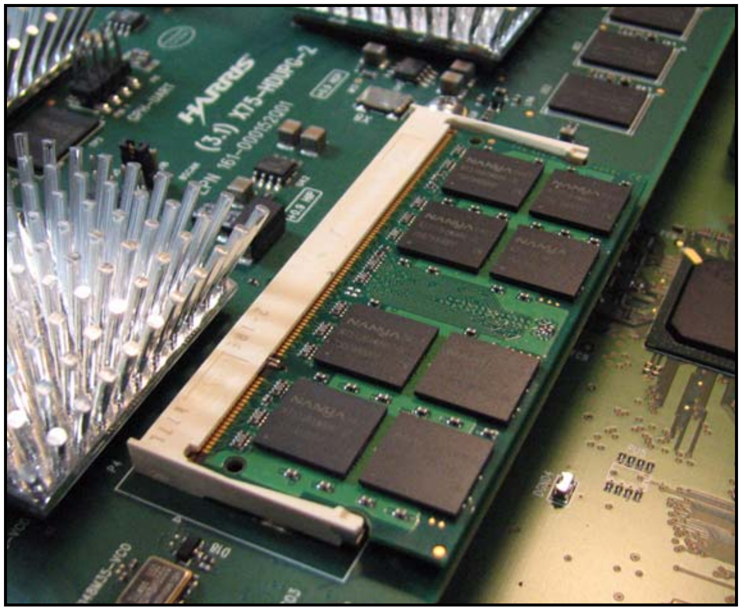


Figure C-23. Memory Module

To install the program delay memory module, follow these steps:

1. Remove the screws along the back edge and each side of the X85/X75 chassis cover (see Figure C-2 on page 335), and then slide off the cover.

   Retain the screws for later use.

2. Gently insert the connector side of the submodule into the memory module socket of the X85 HD module.
3. Press the submodule edges down slowly until it locks into place.
4. Replace the chassis cover using the original screws.
5. Power up the X85 frame.
6. Using CCS Navigator, enter the keycode combination into the appropriate text box to enable the features you have purchased.

Installing and Removing X75OPT-A3D or X75OPT-PQM Video Modules

Installing a New Module

If you have ordered an optional X75OPT-A3D or X75OPT-PQM module separately, follow the installation steps listed below.

NOTE

This module is not hot-swappable. To prevent damage, ensure that the power to the X75 is off before inserting or removing the module. See page 361 for additional configuration information about the X75OPT-A3D-1 module.

1. Remove the chassis cover (see “Preparing the X75 or X85 for Servicing” on page 335).
2. Remove the blank filler plate on the rear panel where the new module is to be installed, retaining the screws.
3. Remove the packaging from the module.

   The X75OPT-A3D and X75OPT-PQM packages include one board, three stackers, and the required number of standoff screws.
4. Turn the board upside down and insert the three stackers into the corresponding connectors on the board. See Figure C-24.

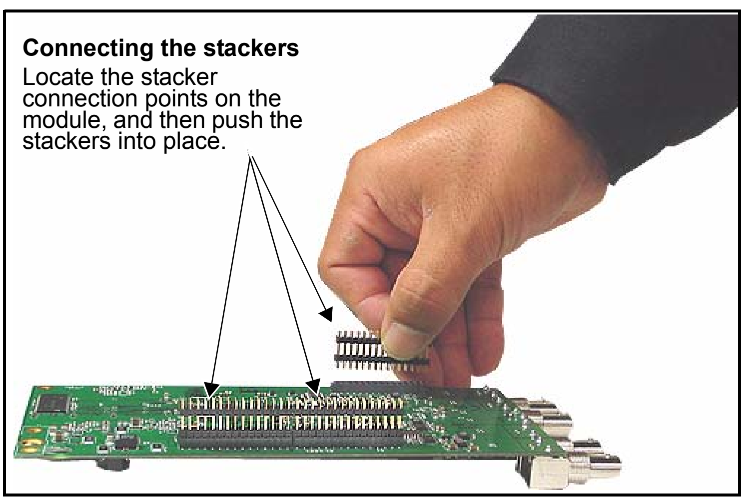


Figure C-24. Connecting Three Stackers to Module

5. Return the module to its upright position, and then align it with the installed standoffs on the main board.

   There are three standoffs on the back edge of the main board, and one in the middle. The middle standoff along the back edge of the module is higher than the others in order to assist with alignment. See Figure C-25 and Figure C-26.

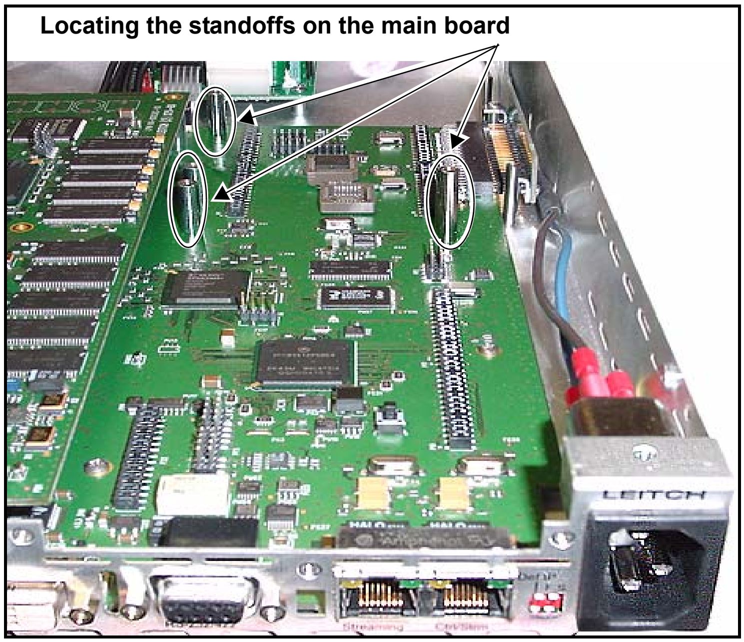


Figure C-25. Locating Main Board Standoffs

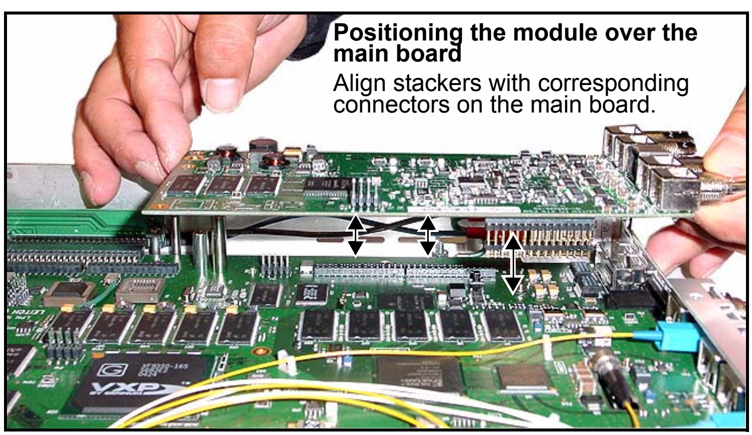


Figure C-26. Positioning Module over Standoffs

6. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push the board gently over the main board stacker connection points until they lock into place.

   Figure C-27 illustrates the area of the module you should push so that the stackers lock firmly into place.

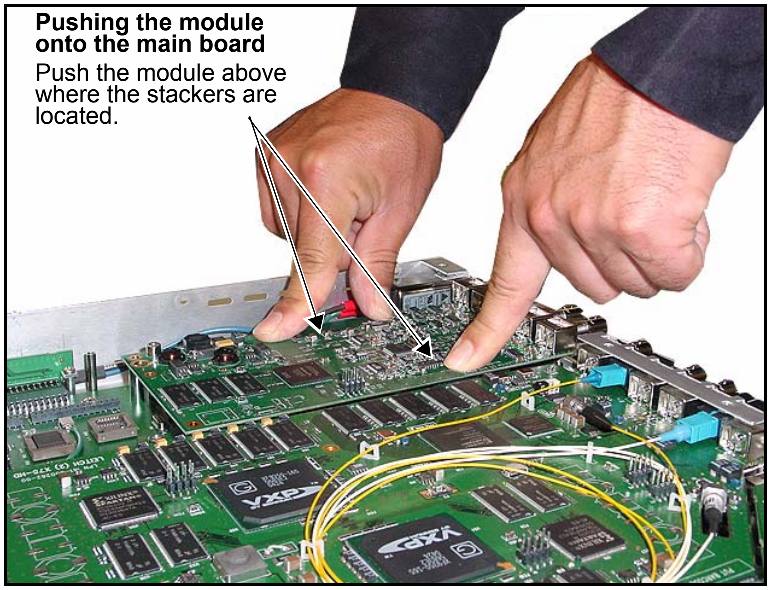


Figure C-27. Pushing the Module on to the Main Board (X75 Shown)

7. Secure the new module to the main board using the provided screws.

   Figure C-28 on page 360 illustrates the location of the three module standoffs where you need to apply the screws.

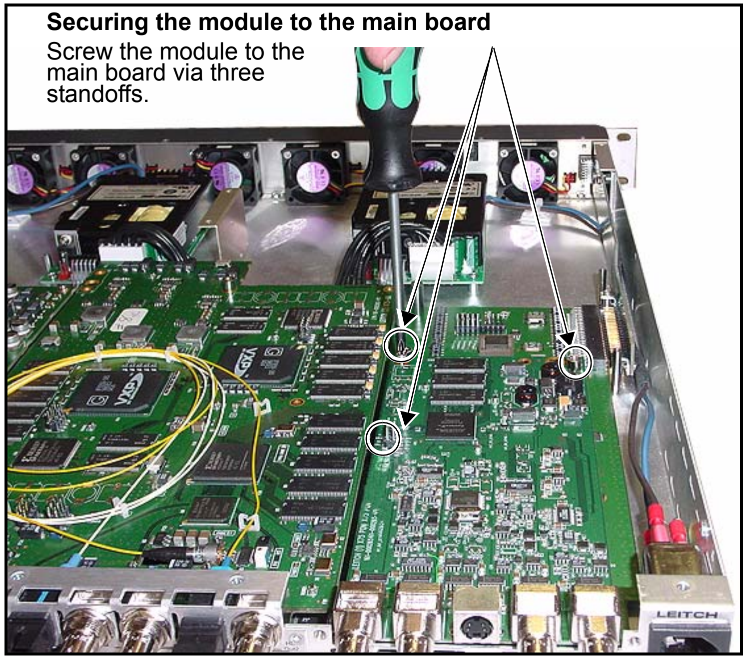


Figure C-28. Securing the Module to the Main Board

8. Screw the back panel into place using the screws removed in step 2.
9. Replace the chassis cover using the original screws. See page 335 for more information on replacing the cover.

Removing an Existing Module

If you must remove an existing X75OPT-A3D or X75OPT-PQM module, follow these steps:

1. Remove the screws along the back edge and each side of the frame's chassis cover (see Figure C-2 on page 335), and then slide the cover off.

   Retain the screws for later use.
2. Remove the three rear connector screws that secure the module to the frame.
3. Remove the three screws that secure the module to the main board.

   See Figure C-28 on page 360 to locate these screws.
4. Gently lift the module off of the main board.

   Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.
5. Inspect the connectors on the module and main board to ensure that all pins are straight.
6. Store the board in a protective bag to protect it from damage or ESD.

Configuring an X75OPT-A3D-1 Module

The X75OPT-A3D-1 module is similar to the X75OPT-A3D, but uses an alternate color decoder algorithm. Typically, these modules are factory installed. However, if you add a new X75OPT-A3D-1 to an existing X85 or X75 unit, or if the module is moved from one X85/X75 unit to another, the module must be reconfigured.

Follow these steps to configure the X75OPT-A3D-1 module:

1. Simultaneously hold the SHIFT + CTRL + NR buttons.
2. When the Harris logo appears on the display screen, release the buttons.

   The factory calibration mode is now enabled.
3. Follow this parameter path:
   System Config > Factory > Calibration > Analog Input (A3D) > Ext Notch Filter > Enable.
4. Press the **Exit** button twice.

5. Select **Save Cal**, and then select **Yes.**

   The X75OPT-A3D-1 module is now functional. To make the version change visible in the **Status/Version Info** menu, you must first reboot the X85/X75.

NOTE

The X75OPT-A3D-1 module requires version 1.4 or higher software.

Installing and Removing the Streaming Module

Installing a New Module

If you have ordered an X75OPT-STR streaming module separately, follow the installation steps listed below.

CAUTION

This module is not hot-swappable. To prevent damage, ensure that the power to the X85/X75 is off before inserting or removing the module. This module requires version 1.7 or later X85/X75 firmware.

1. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push then board gently over the main board stacker connection points until they lock into place.

   Figure C-29 illustrates the area of the module you should push to lock the stackers into place.

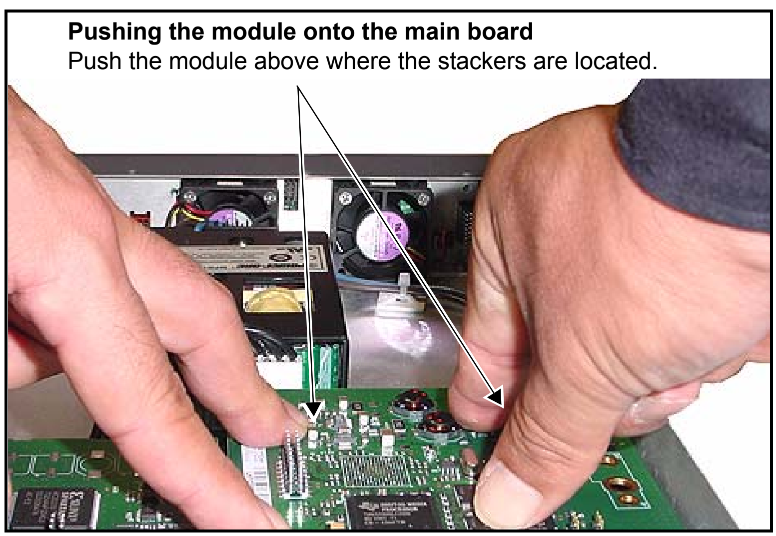


Figure C-29. Pushing the Module on to the Main Board

2. Secure the new module to the main board using the provided screws.

   Figure C-30 on page 364 illustrates the location of the three module standoffs where you must install the screws.

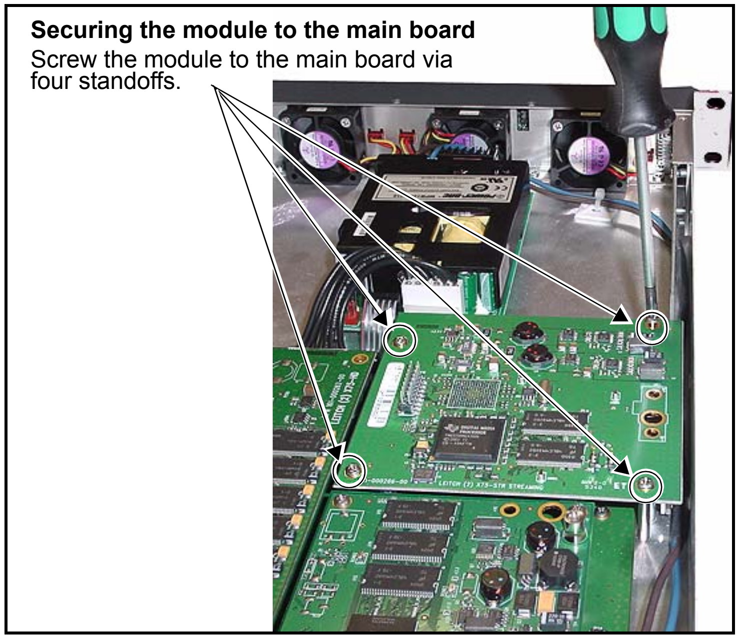


Figure C-30. Securing the Module to the Main Board

3. Replace the chassis cover using the original screws. See page 335 for more information on replacing the cover.
4. Go to the streaming module’s network address parameters in the main menu by following:

   High End Streaming > Network Settings
5. Make the necessary **Gateway**, **Subnet Mask**, and **IP Address** settings in the **Network Settings** parameters, as shown in Figure C-31 on page 365, and then select **Save IP > Yes**.

   The default settings are:

   - Gateway: (192.168.100.1)
   - Subnet Mask: (255.255.255.0)
   - IP Address: (192.168.100.252)

6. On a computer linked via Ethernet to the X85 or X75, visit www.apple.com and then download the free QuickTime™ version 7 player.
7. Launch QuickTime Player, click **File**, and then click **Open URL**.
8. Type the following text into the **Open URL** field (where **ipaddr** represents the IP Address of the streaming module):

   `rtsp://ipaddr:554/x75streaming`

   The QuickTime player should begin receiving streaming media from the X85 or X75 after a delay of 4 seconds.

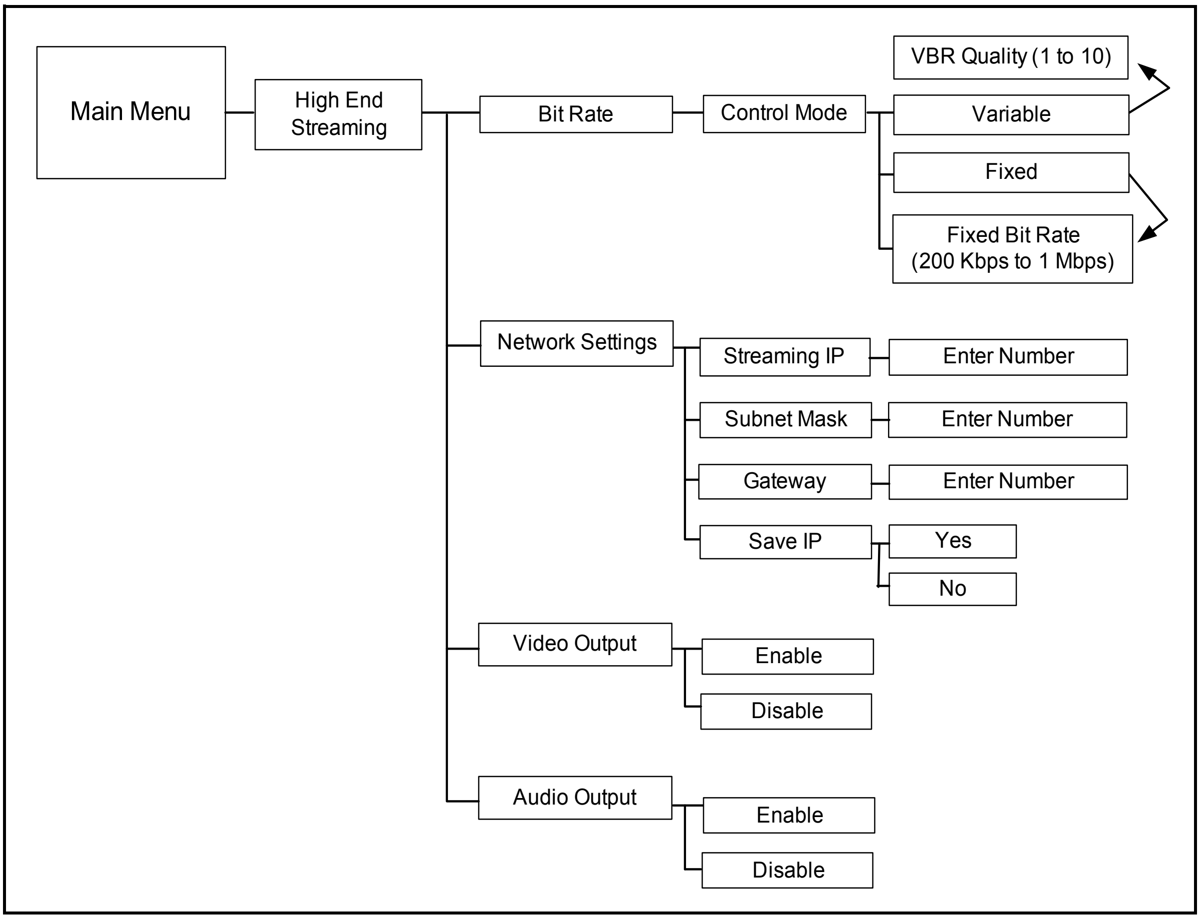


Figure C-31. Streaming Module Settings

Removing an Existing Module

If you must remove an existing streaming module from a unit, follow these steps:

1. Remove the screws along the back edge and each side of the frame's chassis cover (see Figure C-2 on page 335), and then slide the cover off.

   Retain the screws for later use.
2. Remove the three screws that secure the module to the main board.

   See Figure C-30 on page 364 to locate these screws.
3. Gently lift the module off of the main board.

   Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.
4. Inspect the connectors on the module and main board to ensure that all pins are straight.
5. Store the board in a protective bag to protect it from damage or ESD

Launching QuickTime in CCS Pilot and Navigator

The streaming video output is viewable using QuickTime Player directly, or via QuickTime in CCS Pilot and Navigator. (Version 7.0 of the player must be installed.)

In CCS Pilot and Navigator, you can add the streaming video module as a device icon in the **Navigation** window. In CCS Navigator only, you can view the streaming video either by adding a device icon in the **Navigation** window, or by installing a button on a Graphical Navigator page.

Adding Streaming as a Device Icon in the Navigation Window

To add a device icon to launch X85/X75 streaming video, follow these steps:

1. With Pilot or Navigator in Build mode, right click in the **Network**, **Discovery**, or **Temporary** folder of the Navigation window, and then select **Create** > **Server**.

   This will create a **Server** icon in the **Navigation** window.

2. Right-click on the server icon and select **Properties...** from the menu that appears.

   The **Navigation Properties** dialog box opens.

3. Select the **Command** tab, and fill it in with the following information:

   Operation: `Control`

   Command: `c:\program files\quicktime\quicktimeplayer.exe`

   (Or the complete path to your QuickTime Player installation, if it differs from the above)

   Arguments: `rtsp://[IP address]:554/x75streaming`

   (Replace `[IP address]` with the IP address of the X85/X75 streaming Ethernet port)

   You can leave the **Initial Directory** field blank.

4. Close the **Navigation Properties** dialog box by clicking the **Close** button in the top right corner.

When you enter Control mode, double-click on the server icon. This will open a QuickTime Player and play streaming video from the X85/X75.

Adding Streaming via a Button in Navigator

To add a button to launch X85/X75 streaming video, follow these steps:

1. With Navigator in Build mode, place a button on a Graphical Navigator page.

   For information on creating buttons, see "Adding Buttons" in the CCS Navigator online help.

2. Right-click on the button and select **Properties**... from the menu that appears.

   The **Object Properties** dialog box opens.

3. Select the **Rules** tab, and then click the **New Rule** button.

   A new line appears in the Rules table.

4. In the new rule's Event list, select **OnMouseClick**.

The default Condition setting for this event is **Always**; you can leave that as it is, or you can change it by clicking the **Condition** button. See "Defining Condition" in the CCS Navigator online help for information on completing the Condition dialog box.

5. From the new rule's Action list, select **Launch Application**.
6. Click the **Action Properties** button.

   The **Action Property** dialog box opens. Fill it in with the following information:

   - **Command**: `c:\program files\quicktime\quicktimeplayer.exe`
   - **Arguments**: `rtsp://[ip address]:554/x75Streaming`

   You can leave the **Initial Directory** field blank.
7. Click OK to close the **Action Properties** dialog box.
8. Close the **Object Properties** window by clicking the X in the top right corner.

   When you enter Control mode, the new button will open a QuickTime Player and play streaming video from the X85/X75.

Installing Software Options

Installing a Software Option

If you have ordered software options separately (such as the X75OPT-ASL, X75OPT-DOLBY-1, -2, and -3, X75OPT-NR, and X75OPT-HDDUOCON), you will require a soft keycode. (Some options consist of a hardware plug-in with software key license.)

The software license is an unlock code, consisting of fourteen hexadecimal digits, will be provided when you purchase the option. Once you install the option, use a control panel or the web client server software to install the code.

Using the control panel or web server application, follow this thread to install the unlock code: **System Config** > **Setup** > **License Key**.

Operating the X75OPT-AS-32 /16 /8-L Audio Limiters

Audio limiters are available for the 32-, 16-, and 8-channel versions of the X75OPT-AS-32 /16 /8 audio synchronizers. The audio limiters have the following available options:

- Soft Limit Level
- Slope
- Attack Time
- Decay Time
- Noise Gate Level
- Noise Gate Time

Table C-3 describes the various options of the audio limiter.

Table C-3. Audio Limiter Options

Option	Description
Soft Limit Level	• Sets the threshold level for the input audio signal, measured in dB (decibels), where the audio signal limiter's attack and decaying function will be based • When a signal exceeds this level, compression will be applied
Slope	• The amount a signal is reduced by the compressor • When the slope is set to 0.25, the audio input signal exceeding the soft limit threshold level will be reduced by a factor of 4 at the output
Attack Time	• Limiter will be activated only after the input audio level remains over the Soft Limit Level for the duration specified in the Attack Time option • Audio that exceeds the specified Soft Limit Level for less than the specified Attack time will not activate the limiter • Attack Time indicates how long it takes for the compressor to act after a signal has exceeded the threshold level
Decay Time	• Once the input audio signal has exceeded the Soft Limit Level and the limiter has been activated, the limiter remains active until the audio signal has returned below the Soft Limit Level for the duration specified in the Decay Time option • If the input audio signal returns below the Soft Limit Level for less than the specified Decay Time, the limiter remains active
Noise Gate Level	• Sets the noise gate threshold level, measured in dB (decibels) • When an input signal has fallen below this level, the noise gate will be applied
Noise Gate Time	Indicates how long it takes for the noise gate to start or stop acting after the input signal has fallen below or risen above the threshold level

Figure C-32 shows the transfer function of the Audio Limiter:

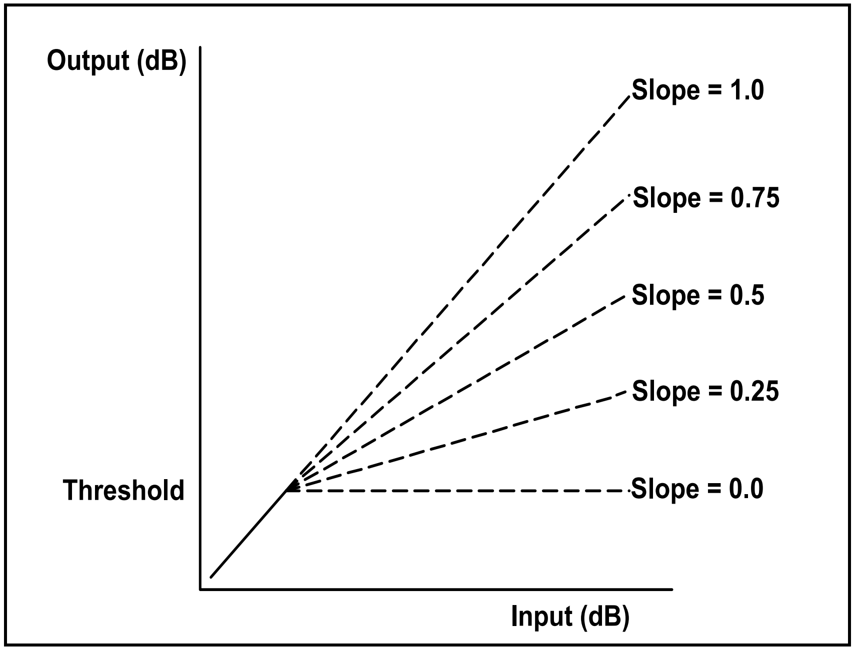


Figure C-32. Audio Limiter Transfer Function

Installing Dolby and DTS Neural Advanced Audio Modules

To add a Dolby or DTS Neural audio option to your X85 or X75, you must first install the new software key. Then remove the existing audio submodule or HD module, and install the Dolby or DTS Neural hardware.The various Dolby and DTS Neural options are described on page 246.

Additional information about the use of Dolby in broadcast applications is available at www.dolby.com. See also the *X85-3G/X85HD/X75SD Dolby and Audio Metadata Applications User Manual*.

NOTE

DTS Neural options are currently supported only by the X75OPT-AS-32 audio submodule, using version 3.4 firmware.

Software Installation

Follow these steps to install the license key:

1. Enter the license key number in the **Other** > **License Key** field, and then press `Enter` on your keyboard.
2. Wait 30 seconds for the change to take effect.
3. Reboot the X85/X75 frame.

   The new license may take a moment before it is enabled for use.

Confirm the license key type by rolling over the **System Config** > **Serial/License** > **License Key** field in CCS Navigator.

Hardware Installation

Dolby

The installation process for the Dolby decoder and encoder modules is similar. However, to insert an *encoder*, you must remove the HD module. To insert a *decoder*, you must remove the audio submodule.

DTS Neural

DTS Neural modules must be installed under the HD submodule, using the same slot as for the Dolby encoders.

CAUTION

Do not attempt to install DTS Neural and Dolby *encoder* modules under the audio submodule. Circuit board damage may result.

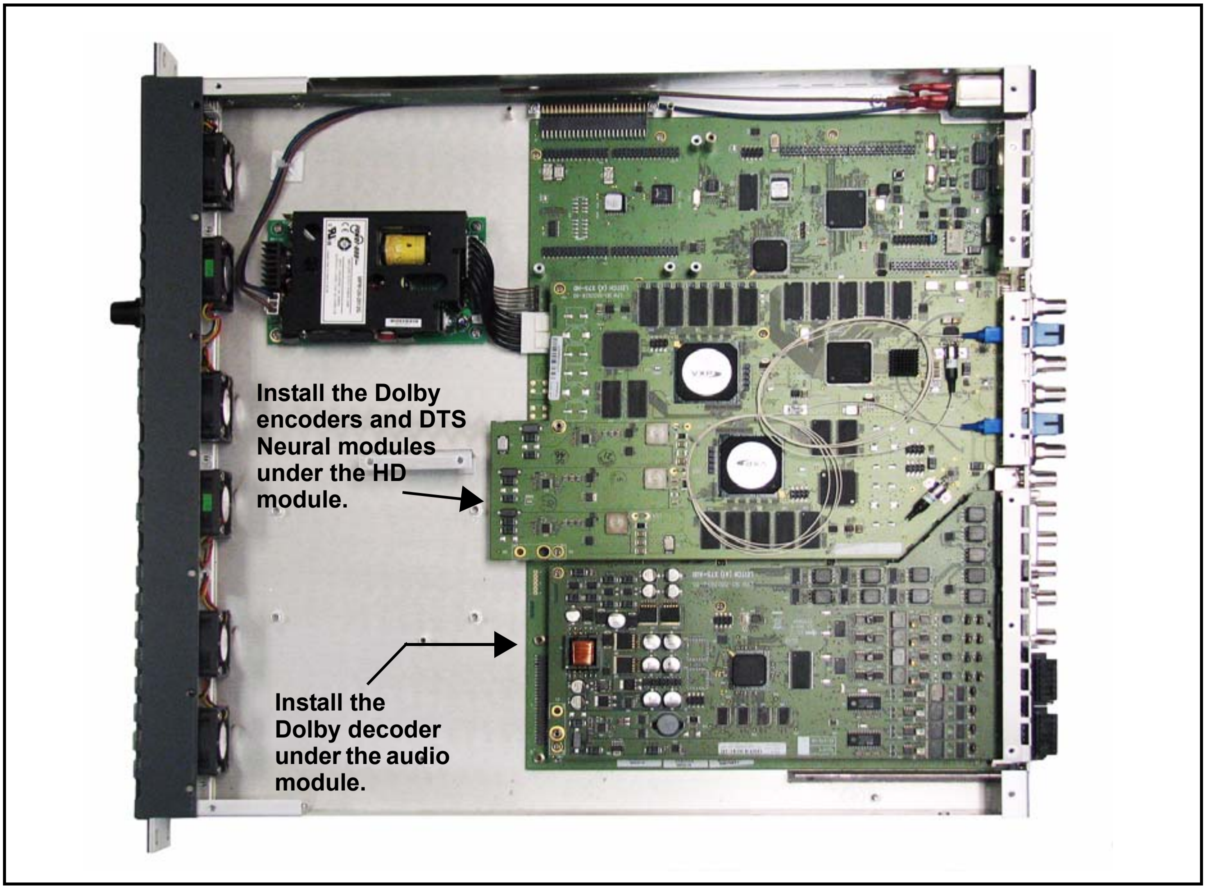


Figure C-33. Locations of Dolby and DTS Neural Modules (X75OPT-HDUPG HD Module Shown)

The following instructions describe the installation of the decoder. The instructions are the same for the encoder and DTS Neural modules, except for the different location inside the X85/X75.

1. Remove the screws along the back edge and on each side of the frame’s chassis covers (Figure C-34), and then slide the covers off.

   Retain the screws for later use.

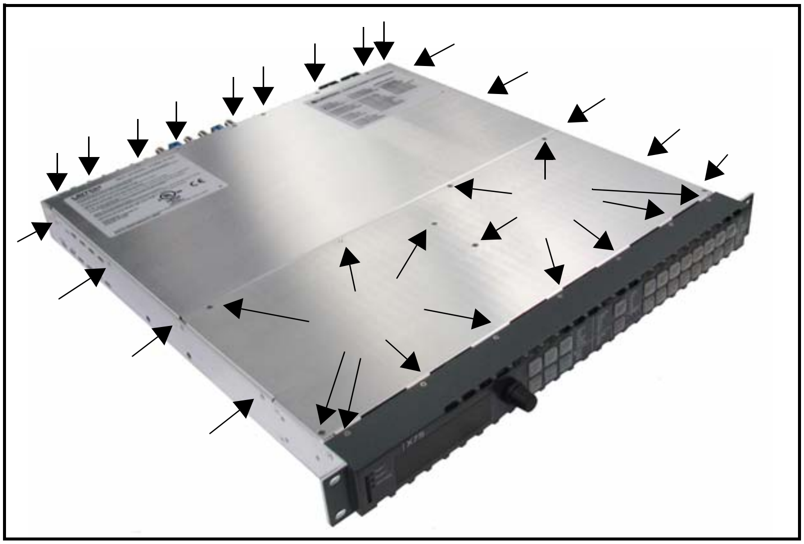


Figure C-34. Chassis Cover Screws

2. Remove the three rear screws that secure the audio submodule to the frame (Figure C-35) and/or the three screws that secure the HD submodule to the frame (Figure C-36).

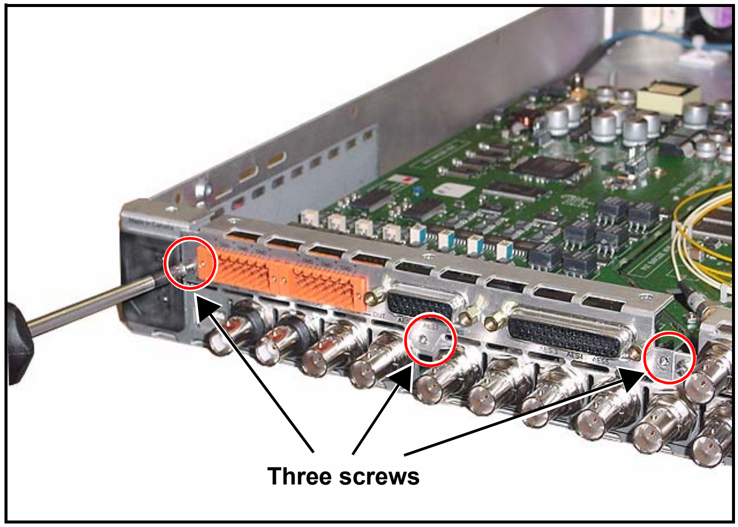


Figure C-35. Removing Audio Back Module Screws

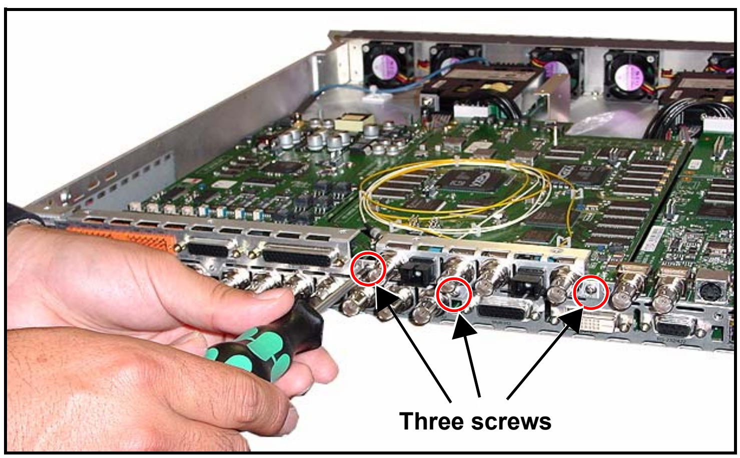


Figure C-36. Removing HDTV Back Module Screws (X75OPT-HDUPG HD Module Shown)

3. Remove the three screws that secure the audio submodule to the main board (Figure C-37) and/or the three screws that secure the HD module to the main board (Figure C-38).

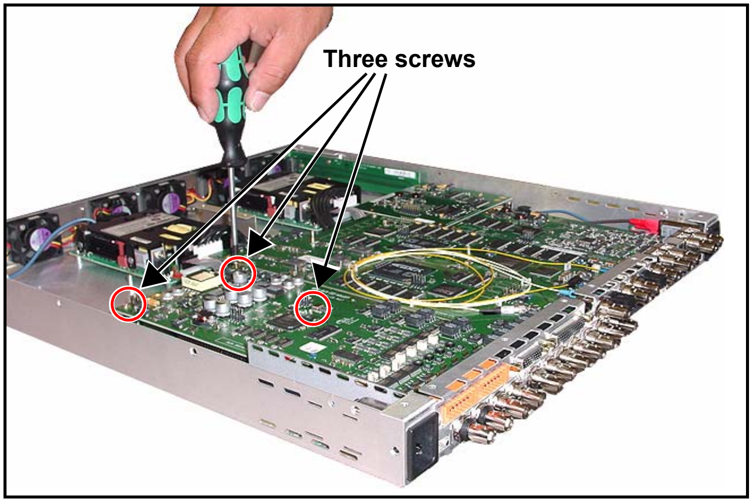


Figure C-37. Removing Audio Board Mounting Screws

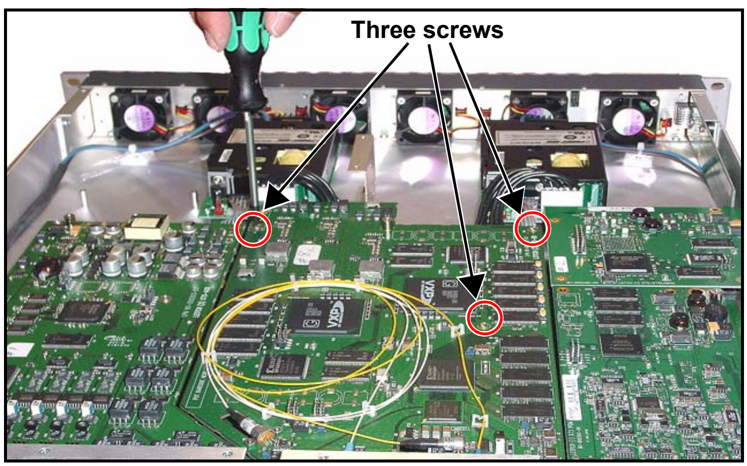


Figure C-38. Removing HDTV Board Mounting Screws

4. Gently lift the audio submodule and/or HD module off the main board.

   Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.

5. Inspect the connectors on the module and main board to ensure that all pins are straight.
6. Insert the Dolby or DTS Neural module into the correct socket; encoders and DTS Neural modules *must* be installed under the HD module. (See Figure C-39.)

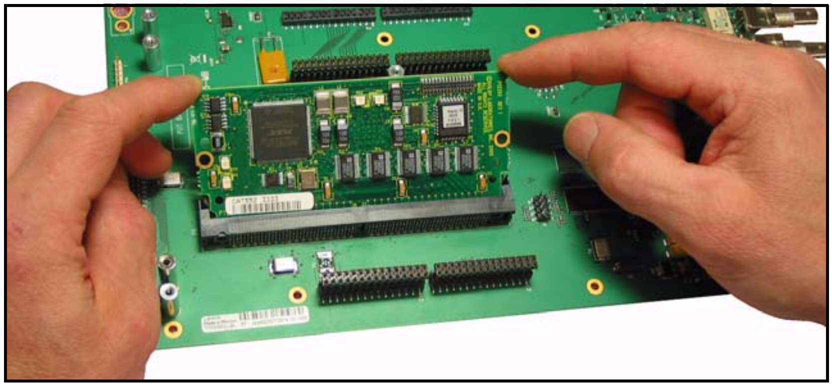


Figure C-39. Inserting Dolby Decoder Module into Socket

7. Press the module edges down slowly until you hear the metal clips click. (See Figure C-40.)

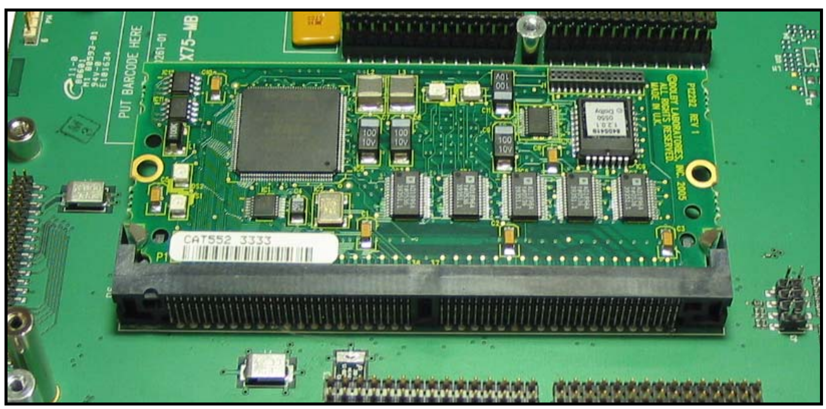


Figure C-40. Dolby Decoder Module Installed

8. Gently reinstall the audio module above the Dolby decoder (or HD board above the encoder), using all of the screws provided.
9. Re-assemble and then power up the X85/X75 frame.

Data Port Information

The X75OPT-DOLBY-1 decoder and X75OPT-DOLBY-2/-3 encoder modules connect internally to the **RS-232/422** port at the back of the X85/X75 unit. All of the Dolby modules use the same port, but are connected to different pins of this DB-9 connector (see Figure C-41 and Table C-4).

NOTE

Dolby audio metadata is typically an RS-485 balanced multi-drop interface. For the audio metadata implementation in the X85/X75, either an unbalanced RS-232 or balanced RS-422 single drop interface is provided. Frame rates above 30 frames per second are not supported.



Figure C-41. Data Port Pinouts

Table C-4. Data Port Pinouts

Audio Metadata	Module	Pins	Serial Interface
Output	X75OPT-DOLBY-1 Decoder	2 (TX+) and 5 (Ground)	RS-232
		2 (TX+) and 7 (TX-) and 5 (Ground)	RS-422
Input	X75OPT-DOLBY-2 Encoder	3 (RX-) and 5 (Ground)	RS-232
		3 (RX-) and 8 (RX+) and 5 (Ground)	RS-422
Input	X75OPT-DOLBY-3 Encoder	3 (RX-) and 5 (Ground)	RS-232
		3 (RX-) and 8 (RX+) and 5 (Ground)	RS-422

To change the serial interface on this port, follow this parameter path:

System Config > Setup> Serial Port Type > RS-232 or **RS-422**
(The default setting is RS-232.)

Softkey Installation

The Dolby decoder requires a softkey code to operate. The softkey can be entered using the control panel or the Web Server software application. Follow these instructions to enable the softkey option:

1. Go to the **System Config > Setup** menu and select **License Key.**
2. Enter the fourteen license key characters and then press **Enter**.

Replacing a Power Supply

This section describes the replacement of a failed X75OPT-PS Power Supply. To install an additional, redundant power supply, see page 383.

NOTE

The default power supply shipped with every X85/X75 is located on the left side of the frame (as seen from the front). An installed redundant power supply is located on the right side of the frame.

Follow these steps to remove and replace an original power supply:

1. Remove all power from the frame, and then remove the chassis cover (see “Preparing the X75 or X85 for Servicing” on page 335 for more information).
2. Locate the failed power supply inside the system, at the front of the unit behind the fan board.

   Power supplies are secured to the chassis floor, and connected to the main board. See Figure C-42.

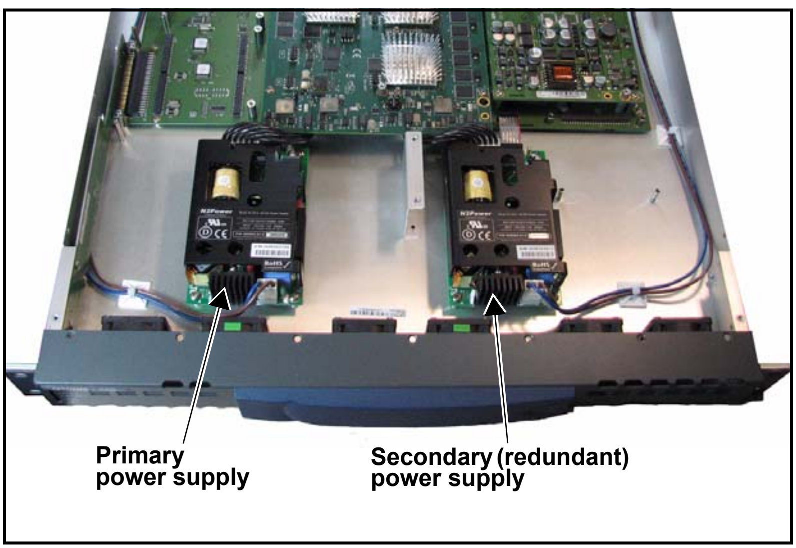


Figure C-42. Location of Connected Power Supply

3. Remove the main DC power cable and secondary DC ribbon cable that connect the power supply. (See Figure C-43.)

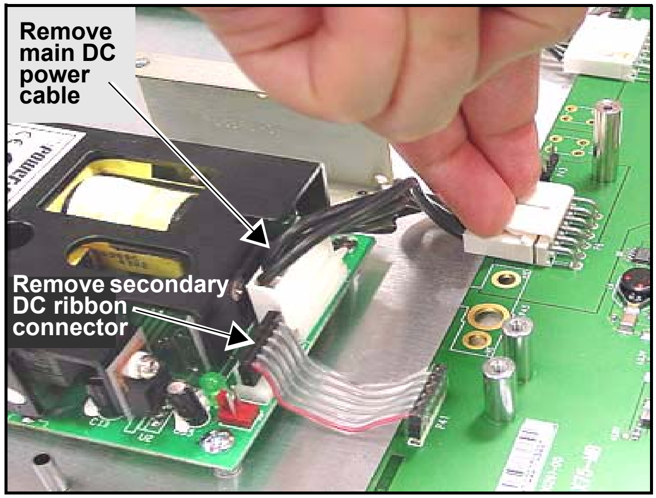


Figure C-43. Removing the DC and Ribbon Cables

4. Disconnect the polarized AC cables from the power supply. (See Figure C-44.)

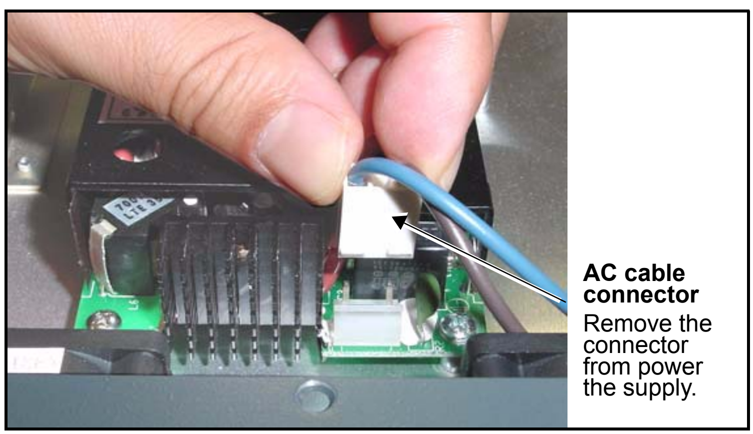


Figure C-44. Removing AC Cable from Power Supply

5. Unscrew the power supply from the chassis floor.

   Figure C-45 shows the location of the four screws you need to remove. Keep these screws for later reuse.

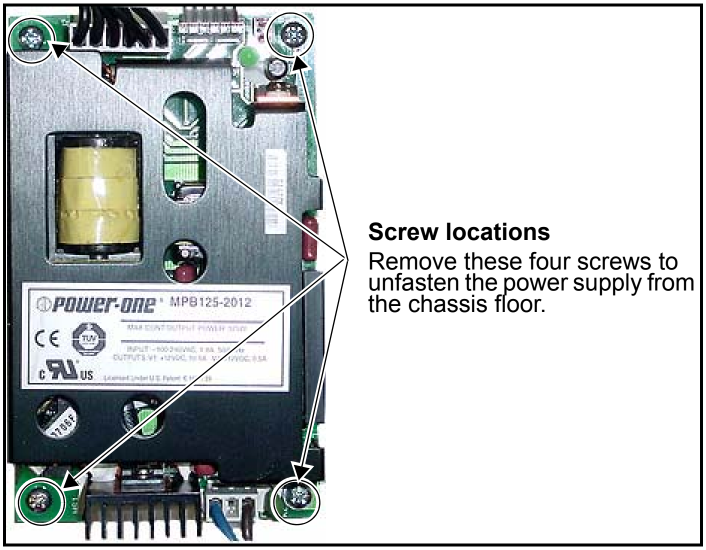


Figure C-45. Removing the Power Supply

6. Remove the power supply from the frame.
7. Replace the old power supply with a new one, following the previous steps in reverse.

CAUTION

If you are removing a redundant power supply, replace the power supply prior to operation or install a cover plate over the AC inlet hole to maintain proper ventilation and avoid overheating.

Installing a Redundant Power Supply

Follow this procedure to install a new, redundant power supply when there is only one power supply currently in the frame:

1. Remove all power from the frame, and then remove the chassis cover. (See “Preparing the X75 or X85 for Servicing” on page 335).

   A redundant power supply is installed on the right side of the frame (labelled 2, below), as seen from the front. (See Figure C-46.)

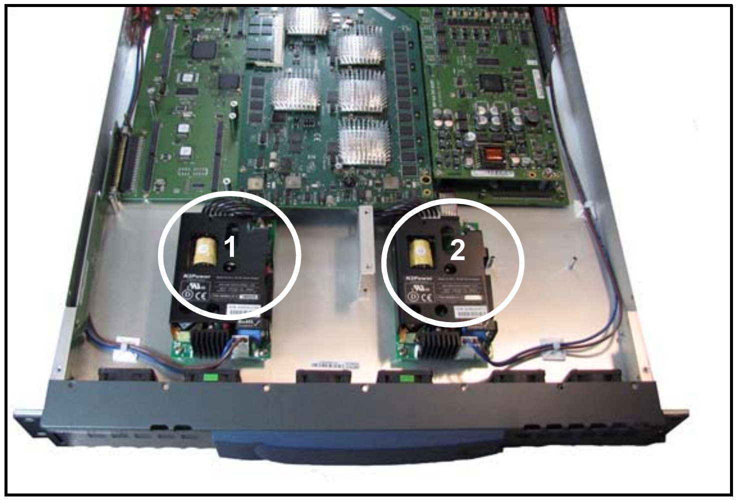


Figure C-46. Where to Install a Redundant Power Supply

2. Install the power supply onto the four standoffs on the chassis floor, and then screw into place. (See Figure C-45 on page 382.)

   The two-pin AC cable connector faces the front of the chassis, while the six-pin DC cable connectors face the rear.

NOTE

If the HD submodule has been installed on this X85/X75, you may need to remove it first before connecting the DC cables.

3. Connect one end of the main DC power cable and the secondary DC ribbon cable to the main board, and the other end of each cable to the power supply. (See Figure C-47.)

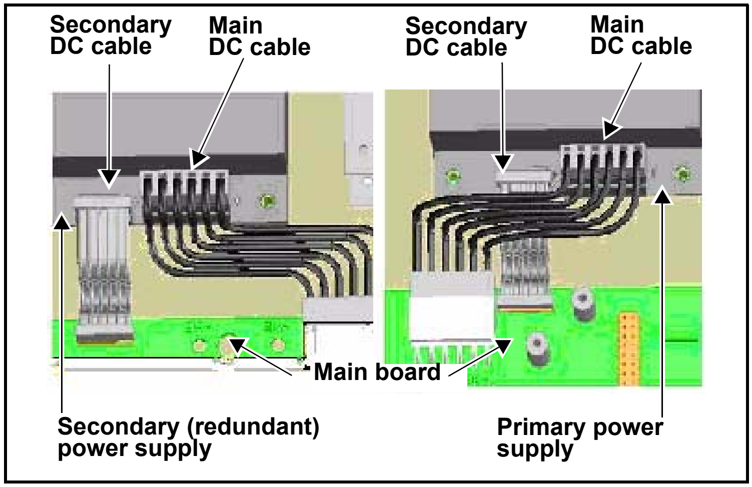


Figure C-47. Connecting DC and Ribbon Cables

4. Plug the end of the AC cable assembly with a two-pin connector into the power supply.

   The two-pin connector has polarized live and neutral wires feeding into it, color-coded as follows:

   - Black/Brown: Live wire
   - White/Blue: Neutral wire

   For primary and secondary power supplies, ensure that the neutral wire is on the left side and the live wire is on the right, as seen from the front. (See Figure C-48 on page 385).

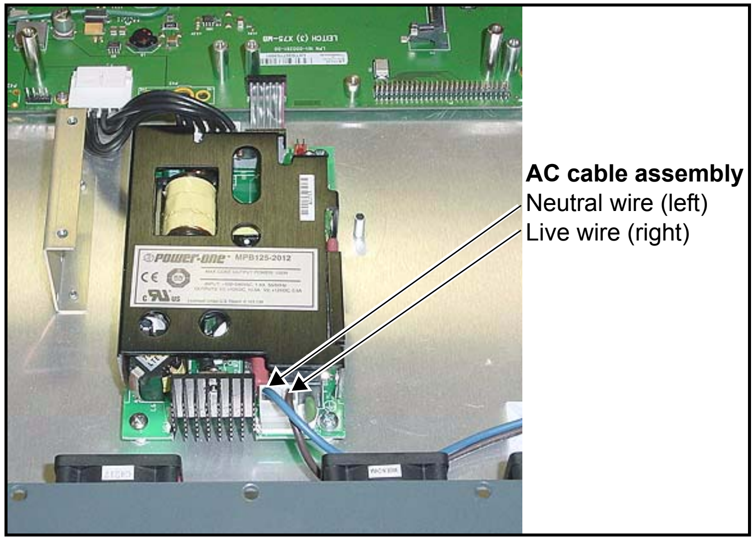


Figure C-48. Connecting AC Cables to Power Supply

5. Secure the AC cabling to the chassis. (See Figure C-49 on page 386.)

   To do this, follow these steps:

   a. Attach the self-stick tie holders to chassis floor (two places for each power supply's AC cabling).

   b. Feed the tie wraps through the holders.

   c. Wrap the tie wraps around the AC cabling.

   d. Clip any extra tie length.

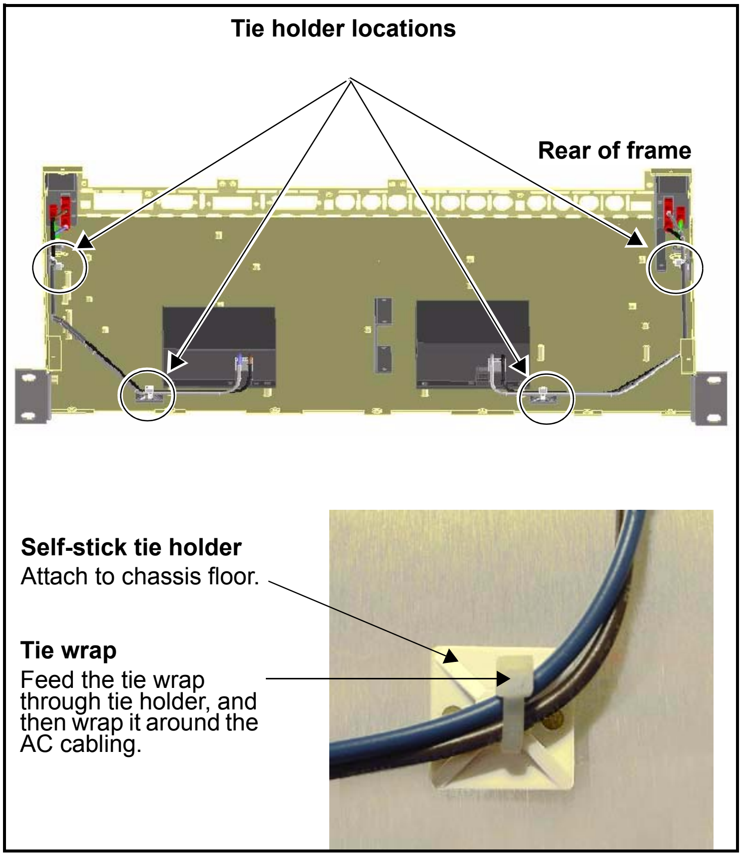


Figure C-49. Attaching Tie Wraps to AC Cabling

6. Take off the AC inlet cover plate by removing the inlet cover screw on the chassis side, and then install the new AC inlet into the slot. (See Figure C-50 on page 387.)

   Ensure the following during installation:

   - The ground plug on the inlet faces the outside chassis wall.
   - The AC inlet snaps securely into place.

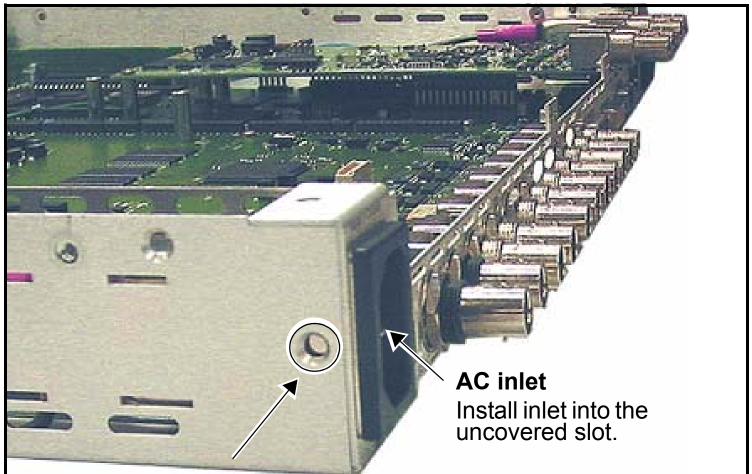


Figure C-50. Removing Cover Plate and Installing AC Inlet

7. Securely plug the AC wires into the appropriate AC inlet blade terminals.

   There are three wires: Live (black/brown), Neutral (white/blue), and Ground (green/yellow). The Live wire plugs on top of the Neutral wire, while the Ground wire always plugs into the single row slot that is closest to the chassis wall. (See Figure C-51.)

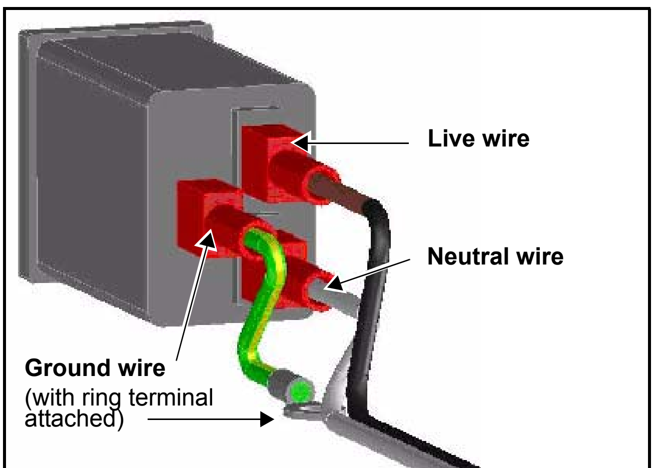


Figure C-51. Connecting AC Cables to Inlet

8. Place the attached ring terminal on the end of the ground wire over the stud on the chassis floor, and then secure it into place with the supplied nut to ground the unit.

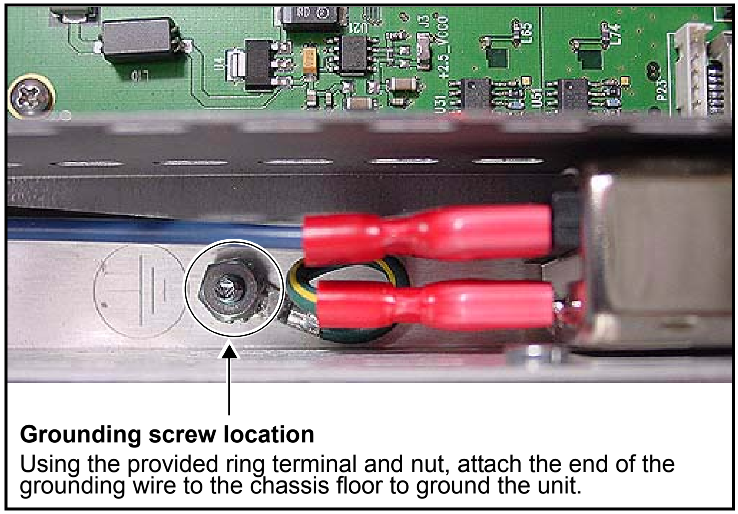


Figure C-52. Grounding AC Inlet

9. Replace the cover on the frame, and then return power to the unit.

   See "Preparing the X75 or X85 for Servicing" on page 335 for more information on replacing the cover.

Installing Fans

To replace a fan, or individual fans within the assembly, follow these steps:

1. Remove the four front mounting-ear screws, and then pull the frame out a few inches from the rack.

   Retain the screws.

2. Remove the seven screws along the top and bottom of the front panel that hold the control panel to the frame. (See Figure C-53.)

   Retain the screws.

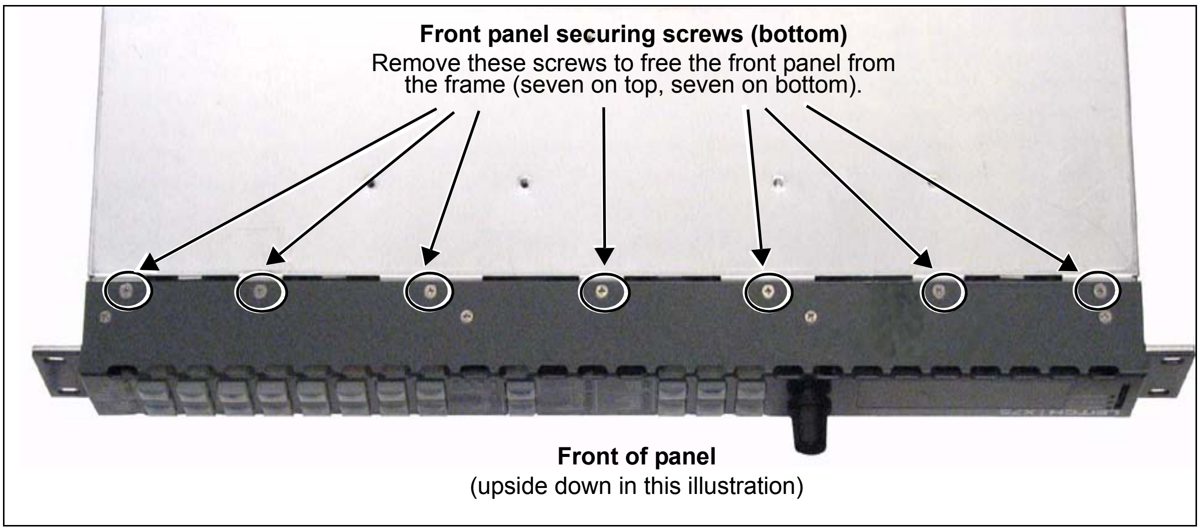


Figure C-53. Freeing the Front Panel from the Frame

3. Pull the front panel away from the frame. (See Figure C-54 on page 390.)

   Although a frame-mounted local control panel is shown, this procedure also applies to blank front panels.

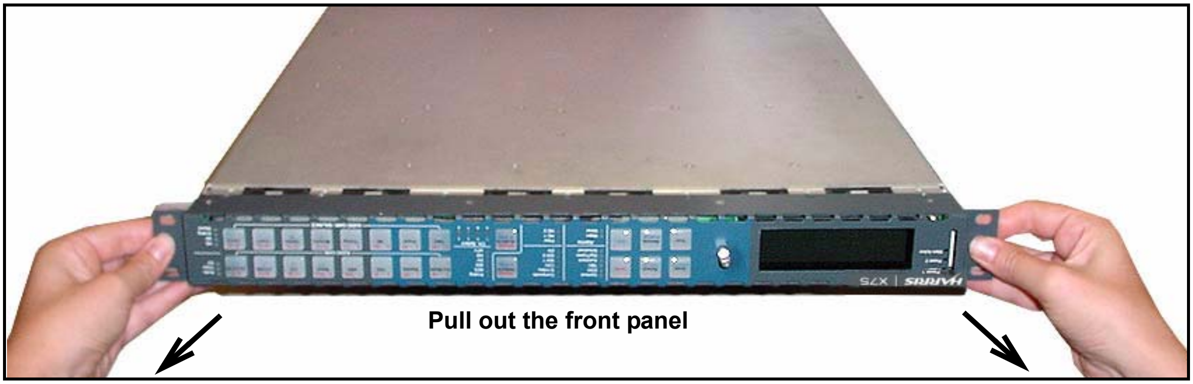


Figure C-54. Removing the Front Panel

4. Identify the fan you are replacing on the back side of the front panel, and then remove the corresponding header wires from the fan assembly connector. (See Figure C-55.)

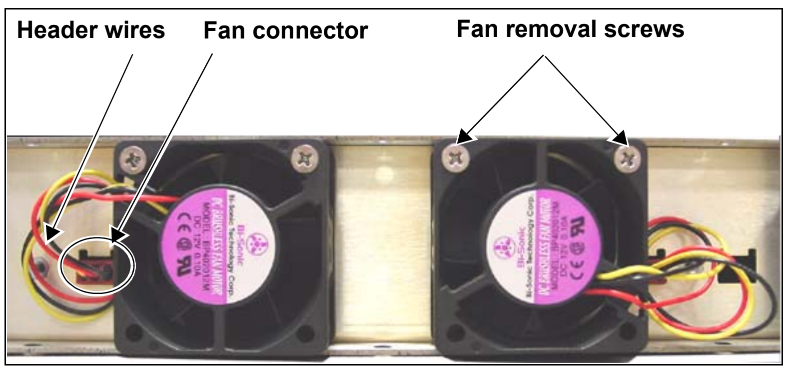


Figure C-55. Removing Header Wires from Fan Assembly Connector

5. Unscrew the fan, and then pull it away from the assembly to remove it.

6. Fasten a new fan into place on the assembly with the supplied screws. (See Figure C-56.)

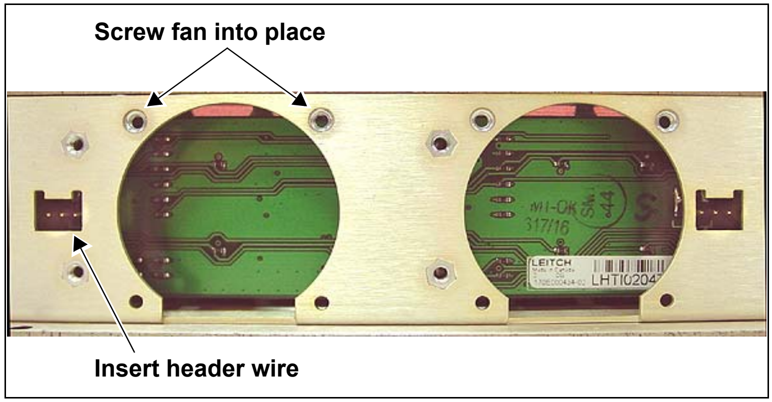


Figure C-56. Replacing a Fan within the Assembly

7. Connect the new fan's header wires to the corresponding fan assembly connector.
8. Secure the front panel to the frame using the original screws from step 2.
9. Close the front panel, re-establish any connections, and then reapply power to the frame.

X75-RCP Fuse Rating and Replacement

The X75-RCP input is protected by a 2A slow blow fuse, located in the AC power supply.

CAUTION

To avoid the risk of fire, you must always replace the fuse with the same type of fuse and specified rating. Failure to comply may result in equipment damage and/or personal injury.

In rare cases, it may be necessary to change the power supply fuse. However, a blown fuse indicates the presence of a serious electrical fault.

To access the power supply fuse, follow these steps:

1. Remove the AC power cord and Ethernet connection from the back of the control panel.
2. Remove the control panel’s mounting screws.
3. Remove the four screws on the top of the unit, and then remove the flat panel cover.
4. Locate the fuse in the power supply and then remove it.
5. Replace the fuse with another 2 A 250 V 20 mm cartridge fuse.

Fuse Replacement:

CAUTION: For continued protection against risk of fire, replace only with the same type 2 A 250 V 20 mm fuse.

6. Re-install the flat panel cover.
7. Re-connect the AC power supply and Ethernet connection.

X85 HDTV Module Fuse Replacement

The X85OPT-HDUPG module is protected by a 2A slow-blow fuse.If this fuse blows, you should return the module to Harris for servicing. A blown fuse indicates a serious electrical fault.

Appendix D

Software

Overview

This appendix provides information about upgrading the software used in X85 and X75 units. The following topics are covered:

- "Software Upgrading Overview" on page 394
- "Upgrading Procedure Using CCS Applications" on page 394
- "Upgrading Procedure Using an SD Card" on page 397
- "Configuring SNMP Support" on page 398
- "Monitoring and Control Using MIBs" on page 404

Software Upgrading Overview

Software upgrading is a routine procedure that you must perform to install a newer version of software on your X85/X75. To perform this operation, you can either use CCS Pilot, Co-Pilot, or Navigator software; or if you have firmware version 3.0 or later, you can use an SD card update (see page 397) . Use care to ensure that you upload the correct files to the intended device.

In the unlikely event that the upgrade fails, the X85 or X75 may not respond to controls and will appear to be non-functional. In that event, follow the troubleshooting information that starts on page 317 of this manual.

Before beginning the upgrading procedure using CCS software, ensure that you have written down the IP address of your X85/X75. To do this, select the Build mode in CCS software. Right-click on the module, select **Properties**, and then click **Device**. The IP address appears in the second **Device ID** field.

NOTE

During the upgrade procedure, the unit may reboot several times.

Upgrading Procedure Using CCS Applications

Follow these steps to upgrade the software:

1. Download the most recent X85/X75 upgrade package from our website.
2. Set your CCS Pilot or Navigator software to the Build mode.
3. If the affected X75 has not been discovered, perform the **Discovery** operation, as described in your CCS software application manual or online help, and then save the results.
4. From the **Tools** menu, select **Software Upgrade**.

   The **Software Upgrade** window opens or is brought to the foreground (see page 395).

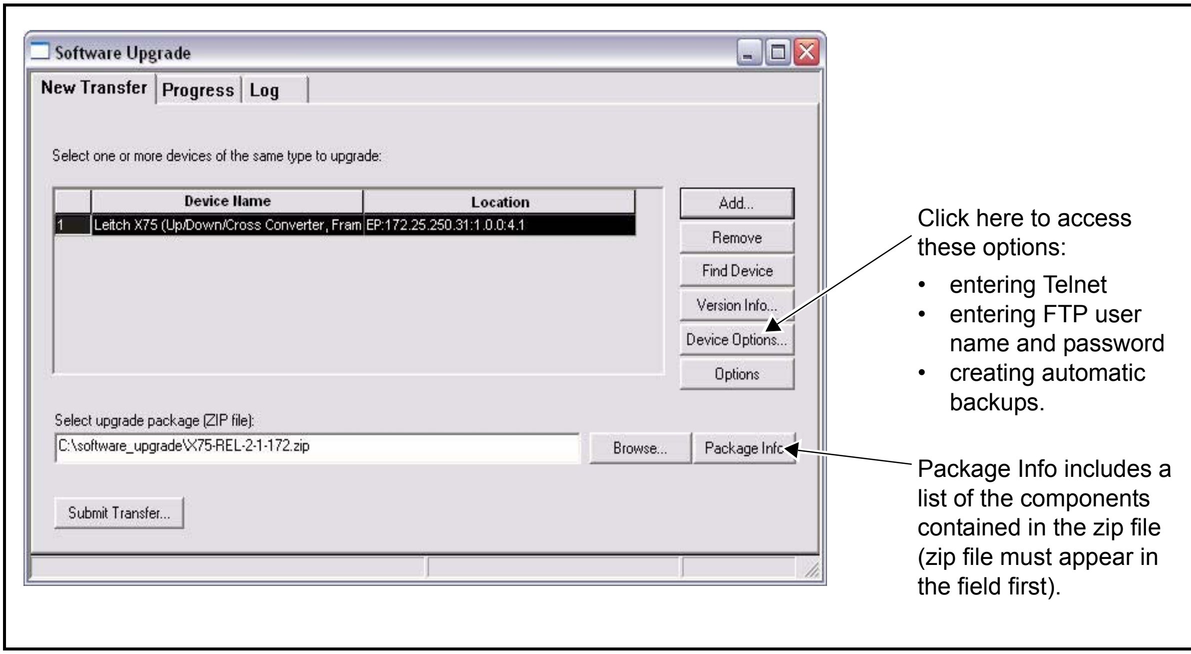


Figure D-1. Software Upgrade Tool’s New Transfer Tab

5. On the **New Transfer** tab, click **Add**.

   The **Device Selection** dialog opens.

6. Select one or more devices, and then click **OK** to close the **Add Device** dialog box.

   Here is some additional information:

   - The selected devices appear in the table on the **New Transfer** tab of the **Software Upgrade** window. This table lists devices that are to receive the same upgrade package.
   - You can highlight the position of each device in the Navigation pane by clicking **Find Device**.
   - Check the current software version by clicking **Version Info**.
   - To create an automatic backup of the old version of the software, click the **Device Options...** button. Then, in the new window, place a check beside **Automatic Backup** and enter a file name, or click **Browse** to choose a new file location for the backup. Click **OK**.

7. In the **Software Upgrade** window, press **Browse...** to select the software upgrade package (ZIP file) that you want to upload.

   A standard **Windows File Selection** dialog box opens.

8. Choose the upgrade ZIP file on a local or network drive, and then click **Open**.

   The selected file's path name is displayed beside the **Browse…** button.

9. Click **Submit Transfer...**

   A dialog box opens, requesting confirmation that you want to proceed with the request. If you have multiple devices selected, multiple transfer tasks are submitted—one per device.

   The extraction process on the ZIP file is handled as part of the upgrade process. You do not need to extract the files yourself.

   Although the file name disappears from the screen, the transfer is now underway. You may close the **Software Upgrade** window, continue with other tasks, or switch to the **Progress** tab to view the status of the transfers. The transfer may take several moments.

NOTE

Closing the **Software Upgrade** window does not affect any of the transfer processes that may be running in the background. If you try to log off or exit the CCS software while a transfer is underway, a notification window will alert you that processes are still active and will ask if you want to terminate these processes.

10. Click on the **Log** tab and look at the **Transfer Status** column to ensure that all files have correctly updated.

    The module is automatically rebooted following an upgrade procedure.

11. To confirm the correct software version was installed, right click the module in the Navigation pane, select **Configuration**, then **Version**, and then **Software**.

12. Close the window, and continue upgrading your device's software, starting with step 4 on page 394.

Upgrading Procedure Using an SD Card

Follow these steps to upgrade the software using the SD card instead of CCS software. To use this feature, your X85/X75 must have firmware version 3.0 or later.

1. Download the most recent X85/X75 upgrade package from the Harris website.
2. Insert the SD card into the port attached to your PC.
3. In Windows Explorer, unzip the upgrade package to the **x75upgrade** folder on the root of the SD card.
4. Insert the SD Card into the front slot in the X85/X75.
5. Using the scroll knob on the X85/X75 control panel, follow: **System Config > SD Card > SD Card Upgrade > Yes**.

   The upgrade begins. This will take a few minutes.
6. While the upgrade is underway, confirm the package being uploaded by following : **System Config > SD Card > SD Card Upgrade Status**.

   When upgrade is complete, the **SD Card Upgrade Status** parameter will display either **Upgrade Succeeded**, or **Upgrade Failed ([file]).**
7. If the upgrade failed, confirm the file exists on the SD card, or re-copy the file download from the Harris website.

Configuring SNMP Support

With SNMP support, you can use a standard MIB browser to monitor parameters and alarms.

You must set SNMP options using Pilot or Navigator. Before you can configure SNMP support, you must discover the X85/X75.

Activating Your SNMP License Key

A license key may have been included in your purchase of an SNMP-enabled system. Contact Harris Customer Service to purchase one at a later date.

1. While your CCS software is in Build mode, right click on the discovered X85/X75 and choose **Configuration**.

   The **Configuration** window opens.

2. Click on the Device tab.
3. Enter your device key in the **License Key** field, and then click **Write and Reboot**.
4. Close the **Configuration** window.

Setting SNMP Options

Devices that support SNMP will have an **SNMP** tab in the **Configuration** window. To configure an X85/X75 that supports SNMP, follow these instructions.

1. While your CCS software is in Build mode, right click on the X85/X75 and choose **Configuration**.

   The **Configuration** window opens.

2. Click the **SNMP** tab, and then click the **Read** button.

   The CCS network polls the module and retrieves its current settings. It fills in all the fields on the **SNMP** tab of the **Configuration** window with the settings that are on the device.

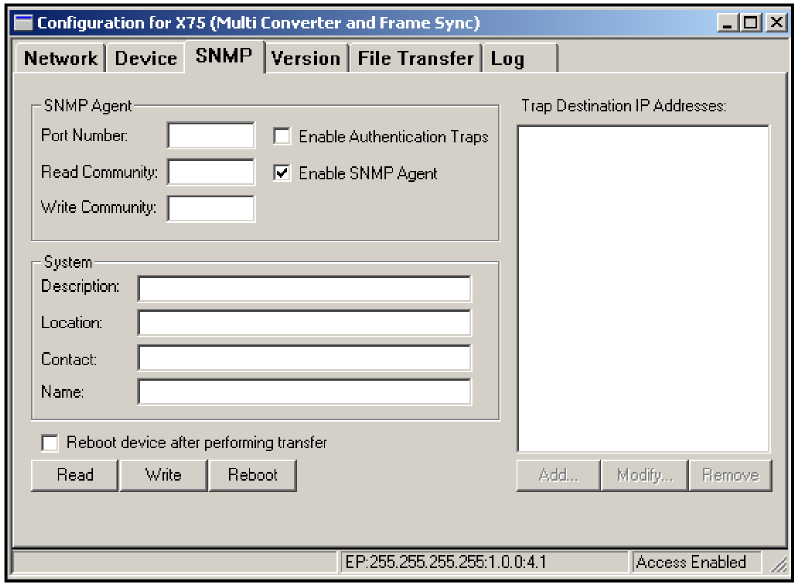


Figure D-2. SNMP Tab on device Configuration Window

If the Read function fails, your license key may not be entered correctly. See "Activating Your SNMP License Key" on page 398.

In the top left portion of the window are SNMP Agent settings.

Table D-1. SNMP Agent Fields of SNMP Tab

Field	Function
Port Number	(Can be from 0 to 65535) The network port used by the SNMP agent; port 161 is the default for X75HD/X75SD
Read Community	Has to match the “read community” setting in your MIB browser
Write Community	Has to match the “write community” setting in your MIB browser
Enable Authentication Traps	When checked, authentication traps are sent if the read or write community doesn’t match between the SNMP agent and MIB browser
Enable SNMP Agent	When checked, SNMP support is available; if not checked, SNMP support is disabled

Below the **SNMP Agent** settings are **System** settings. The information in these fields describes the device that is currently selected in the **Navigation** window. This is user-defined information that, once provided by an administrator, is available on the device when it is retrieved by a MIB browser.

Table D-2. System Fields of SNMP Tab - MIB-2 System Information

Field	Explanation
Description	The default is “Leitch SNMP Agent”
Location	The physical location of the device
Contact	The contact person for this device
Name	Name of the device

The **Trap Destination IP Addresses** field contains a list of IP addresses that will receive SNMP traps. It is in the format IP Address:Port Address:SNMP version.

3. To add new Trap Destination IP Addresses, see “Adding New Addresses for SNMP Traps” on page 401. To modify them, see “Modifying an SNMP Trap Destination” on page 402.

4. (Optional) If you wish the device to reboot automatically when you send the new configuration to it, place a check beside **Reboot device after performing transfer**.
5. Click **Write** to send the new configuration to the device.
6. If you did not place a check beside **Reboot device after performing transfer** in step 6, click **Reboot** now and your changes to the configuration will take effect.

NOTE

The device must be rebooted before changes will take effect.

Adding New Addresses for SNMP Traps

To add a new SNMP trap destination, follow this procedure:

1. Click **Add** beneath the **Trap Destination IP Addresses** field. The **Add Trap Destination** window opens.

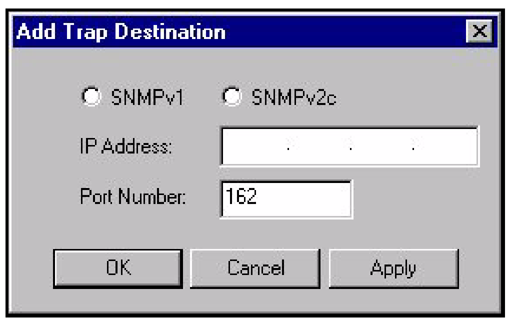


Figure D-3. Add Trap Destination Window

2. Choose the SNMP version that you would like to use for traps.
3. Choose the IP address of that trap destination.
4. Choose the port number. The default is 162, but an administrator can set this to any number between 0 and 65535.
5. Click **Apply**. A new line is added in the **Trap Destination IP Addresses** field.
6. Repeat steps 2 through 5 to add more rows to the window.
7. Click **OK** to return to the **SNMP** tab of the **Configuration** window.

Modifying an SNMP Trap Destination

To modify a trap destination, follow this procedure:

1. In the **Trap Destinations IP Addresses** list, click on the item you would like to modify.
2. Click the **Modify** button. The **Modify Trap Destination** window opens.

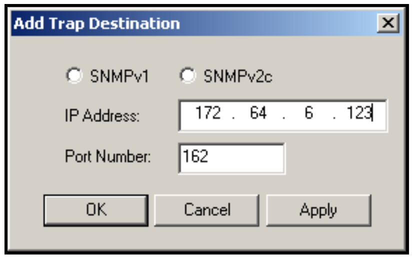


Figure D-4. Modify Trap Destination Window

3. Choose the SNMP version of the traps using the radio buttons at the top of the window.
4. Enter the IP address of that trap destination in the **IP Address** field.
5. Enter the port number in the **Port Number** field.

   The default value is 162.
6. Click **Apply**. The selected entry in the **Trap Destination IP Addresses** field is updated.
7. Repeat steps 2 through 6 to further update the row.
8. Click **OK** to close the **Modify Trap Destination** window.

Configuring Third-Party SNMP Software Control

SNMP is an industry-standard protocol that allows other manufacturers' control software to remotely monitor and control the X85/X75.

Harris provides MIB files that can be downloaded from the website. Two general MIB files (**leitch.mib** and **ccsAlarm.mib**) set up the structure to define parameters and alarms. Once these two MIBs are installed, you will want to install a MIB for each distinct module for which you wish to set up third-party software control.

You can use any standard MIB browsing software with your X85/X75.

1. Make the required network connections between the X85/X75 unit(s) and your PC with installed SNMP browser/control software.

   The SNMP configuration process for the X85/X75 directs the SNMP agent where to send alarms (SNMP traps). This file must be modified before it is loaded back to the X85/X75. For information on configuring SNMP, see page 398.

2. Load the leitch.mib file into your SNMP browser/control software.

   This MIB sets up the basic structure for product specific Harris MIBs. It can be found under the **Private** > **Enterprise** branch, and sets up the leitchProducts and leitchCommon sub-branches.

   The **leitchCommon** branch is initially empty. The **leitchProducts** branch contains folders for different families of Harris devices—for example, **LeitchX75**, **NEO** and **fam6800plus**.

3. Load **ccsAlarm.mib** into your SNMP browser/control software.

   This MIB adds a **ccsAlarms** sub-branch to the **leitchCommon** folder. When it is installed, you will be able to receive traps with proper information as to where the alarms are triggered from.

4. Load product-specific X85/X75 MIB files into your SNMP browser/control software.

   A product-specific MIB provides a clear path to the parameters and alarms on the device. Harris MIBs can be downloaded from our website.

   X85/X75 MIBs will appear in the X85/X75 folder under the **leitchProducts** folder. See Figure D-5 on page 405.

5. Configure your MIB browser to connect to the unit by entering the **IP address**, **Port** (if you have changed the Port from its default in the configuration), and other standard configuration settings.

Your browser should now be able to connect to the SNMP agent running on the X85/X75 unit. If you wish to receive traps, start up the trap receiver in your MIB browser software.

NOTE

To verify that your configurations are correct, you can walk MIB2.

For SNMP troubleshooting information, see page 298.

Monitoring and Control Using MIBs

Each X85/X75 unit's MIB can be fully expanded. When you expand an X85 or X75 MIB node in the tree view, there are three sub-folders (see Table D-3).

Table D-3. MIB Sub-Folders

Tree View Item	Contents
Objects	Lists the parameters for the device; all configurable and read-only parameters appear here (see Figure D-5)
Identities	Lists the alarms information for the device which is used by the MIB browser to make trap messages more meaningful (see Figure D-6 on page 406.)
Conformities	A group of standard MIB information that guarantees that the MIB conforms to standard SNMP format

To view a complete list of the parameter settings on the X85 or X75, walk the MIB for that X85/X75, walk the X85/X75 at an IP address, or walk the X85/X75 type.

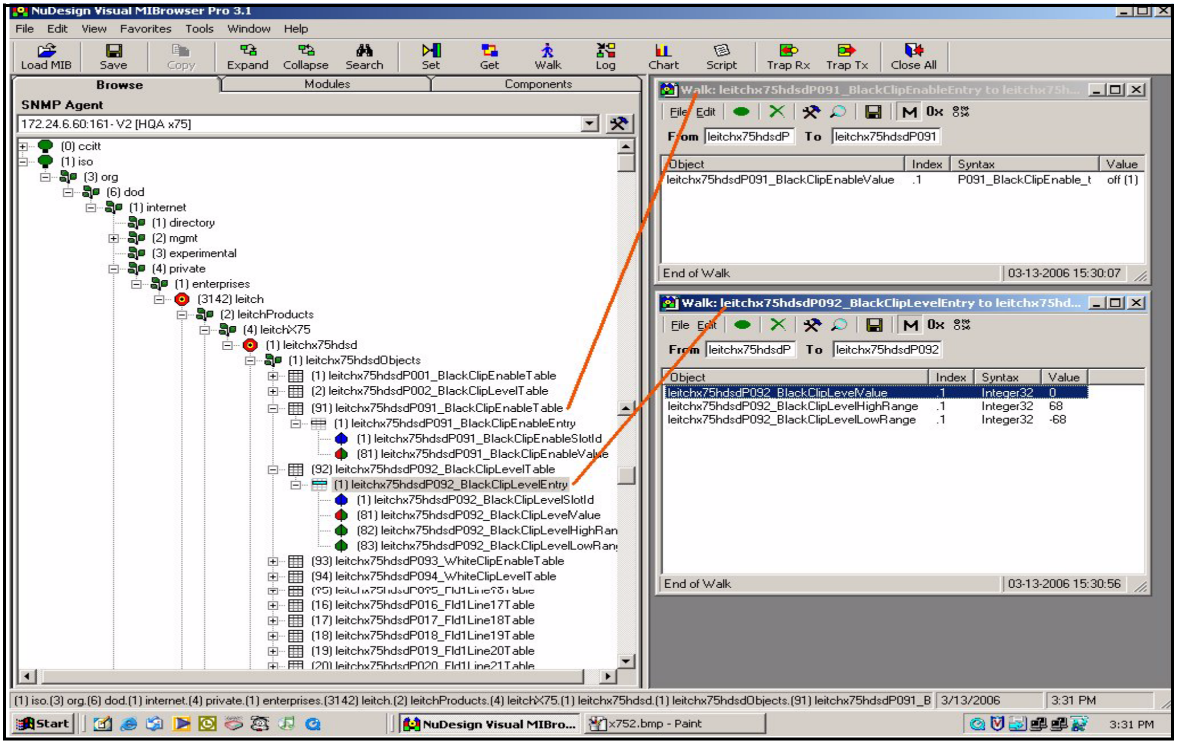


Figure D-5. Typical MIB Loaded into NuDesign MIB Browser

Navigating Parameters in a Leitch MIB

X85 and X75 MIBs contain functionality so that you can view a parameter’s range, walk a device or a frame, or receive alarm traps for a device. See Figure D-6 for an example of alarms shown in a MIB browser.

How you can access these standard features will depend on the MIB Browsing software you use. See the documentation that accompanies your third-party control software for more details.

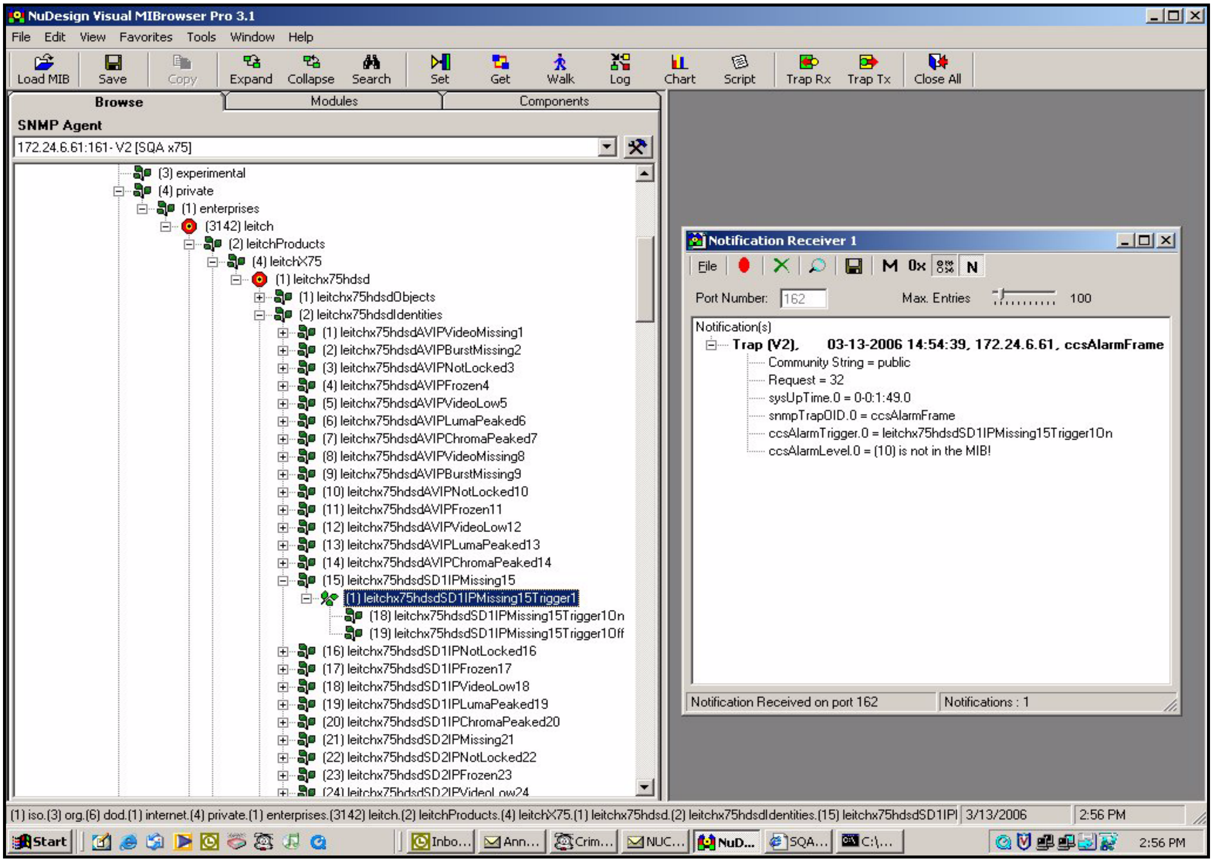


Figure D-6. Alarms in MIB Browser

Parameters that have a limited list of options have two listings under the Entry branch of the tree. Parameters that have a range (as in a slider) of options have four listings under the Entry branch of the tree.

The sub-branches described in Table D-4 are shown in Figure D-5 on page 405.

Table D-4. Sub-Branches Under a Parameter in a Leitch MIB

Sub-Branch	Contains
Slot ID	(Does not apply to the X85/X75.)
Value	The current setting of this parameter
High Range (slider ranges only)	The top value of this parameter
Low Range (slider ranges only)	The bottom value of this parameter

For information on the parameters for each individual device, see that device's documentation, posted on our website. Some Harris products have HTML forms that display their parameters, and these are also posted on our website.

Appendix E

Specifications

Overview

This chapter describes all X85 and X75 video, audio, and other miscellaneous performance and hardware specifications.

The following specifications are included:

Video Specifications

Input

Table E-1. 1.5 Gb/s HD-SDI Video Input Specifications

Item	Specification
Standard	SMPTE292M (See "X75 HD Conversion Capabilities" on page 429 for more information.)
Connector	BNC (IEC169-8)
Impedance	75Ω
Return loss	> 15 dB, typical, from 5 MHz to 1485 MHz
Equalization	Adaptive cable equalization for up to— • 328 ft (100 m), typical, of Belden 8281 co-axial cable or • 492 ft (150 m), typical, of Belden 1694A co-axial cable

Table E-2. 3.0 Gb/s HD-SDI Video Input Specifications

Item	Specification
Standard	SMPTE424M (See "X85 Conversion Capabilities" on page 430 for more information.)
Connector	BNC (IEC169-8)
Impedance	75Ω
Return loss	• >15 dB, typical, from 5 MHz to 1485 MHz • >10 dB, typical, from 1485 MHz to 2970 MHz
Equalization	164 ft (50 m) typical, of Belden 1694A co-axial cable

Table E-3. 1.5 Gb/s HDTV Fiber Video Input

Item	Specification
Standard	SMPTE 292M, Mode B Operation (See "X75 HD Conversion Capabilities" on page 429 for more information.)
Number of inputs	2
Connector	LC
Input wavelength	1200 to 1600 nm
Max. input power	0 dBm, typical
Sensitivity	Better than -20 dBm

Table E-4. 3.0 Gb/s HDTV Fiber Video Input

Item	Specification
Standard	SMPTE 424M
Number of inputs	2
Connector	LC
Input wavelength	1260nm - 1610nm
Max. input power	0dBm
Sensitivity	-18dB Typical

Table E-5. SD Video Input Specifications

Item	Specification
Standard	SMPTE259M-C, 270 Mbps, 525/625 component
Connector	BNC (IEC169-8)
Impedance	75Ω
Return loss	>18 dB from 5 MHz to 270 MHz
Equalization	>23 dB Belden 8281 cable

Table E-6. S-Video Input Specifications

Item	Specification
Standard	• NTSC • PAL-M • PAL-B
Connector	4-pin DIN

Table E-7. X75OPT-A3D and X75OPT-PQM Analog Composite Video Input Specifications

Item	Specification
Standard	• NTSC (SMPTE170M) • PAL-B (ITU624-2) • SECAM • PAL-M
Connector	BNC (IEC 169-8)
Quantization	Normal mode, non-TBC: • 12 bits (NTSC, PAL-B, PAL-M) • 8 bits (SECAM) TBC mode: • 8 bits (all standards)
Input level	1.0 V pk-to-pk
Impedance	75Ω
Return loss	> 40 dB, 0.1 MHz to 6 MHz
Common mode range	5.0 V
CMRR	60 dB @ 50/60 Hz, 5 V pk-to-pk
Setup level range	±7.5 IRE
Frequency response	±0.1 dB, 0.1 MHz to 6 MHz
SNR	62 dB, typical (X75OPT-A3D); 58 dB, typical (X75OPT-PQM)
Y/C gain error	<0.1 dB
Y/C delay error	<10 ns

Table E-8. Component Input Specifications

Item	Specification
Format	Betacam
Connector	BNC (IEC169-8)
Input level	1.0 V pk-to-pk
Quantization	Normal mode, non-TBC mode CAV • Y: 12 bits • Cb: 10 bits • Cr: 10 bits Normal mode, non-TBC mode S-Video • Luma: 12 bits • Chroma: 10 bits
	TBC mode • CAV: Not supported • S-Video: 8 bits all
Impedance	75Ω
Return loss	> 40 dB, 1 kHz to 6 MHz
Frequency response	• Y: ±0.15 dB to 5.5 MHz • Pb/Pr: ±0.10 dB to 3.0 MHz
SNR	> 60 dB

Table E-9. Genlock Input Specifications

Item	Specification
Connector	BNC (IEC169-8)
Impedance	75Ω
Return loss	> 40 dB, 0.1 MHz to 6 MHz
Input level	• 1 V pk-to-pk, -5.0 dB to +6.0 dB for NTSC/PAL-B • 1 V pk-to-pk, -3.5 dB to +6.0 dB for Tri-level sync (1080i/720p)
Signal type	NTSC/PAL-B analog composite ±300 mV Tri-level sync (1080i/720p)

Output

Table E-10. 1.5 Gb/s HD-SDI Video Output Specifications

Item	Specification
Standard	SMPTE292M (See "X75 HD Conversion Capabilities" on page 429 for more information.)
Connector	BNC (IEC169-8)
Impedance	75Ω
Return loss	>15 dB, typical, from 5 MHz to 1485 MHz
Signal level	800 mV ± 10%
DC offset	0.0 V ± 0.5 V
Rise/fall time	<270 ps
Overshoot	<10% of amplitude
Jitter	Timing: <1 UI; alignment: <0.2 UI

Table E-11. 3.0 Gb/s HD-SDI Video Output Specifications

Item	Specification
Standard	SMPTE292M (See "X85 Conversion Capabilities" on page 430 for more information.)
Connector	BNC (IEC169-8)
Impedance	75Ω
Return loss	• >15 dB, typical, from 5 MHz to 1485 MHz • >10 dB, typical, from 1485 MHz to 2970 MHz
Signal level	800 mV ±10%
DC offset	0.0 V ±0.5 V
Rise/fall time	<135 ps (20/80), no differ by more than 50 ps
Overshoot	<10% of amplitude
Jitter	Timing: 2 UI; alignment: 0.3 UI

Table E-12. 1.5 Gb/s HDTV Fiber Video Output Specifications

Item	Specification
Standard	SMPTE 292M, Mode B Operation (See “X75 HD Conversion Capabilities” on page 429 for more information.)
Number of outputs	2
Connector	LC
Output wavelength	1310 ± 20 nm
Output power	-7 dBm
Rise/fall time	<270 ps
Jitter	<135 ps pk-to-pk
Laser safety level	Class 1

Table E-13. 3.0 Gb/s HDTV Fiber Video Output Specifications

Item	Specification
Standard	SMPTE 424M
Number of outputs	2
Connector	LC
Output wavelength	1310 +/- 20nm
Output power	-7dBm Typical
Rise/fall time	<135ps Typical
Jitter	<70ps p-p
Laser safety level	Class 1

Table E-14. SD Video Output Specifications

Item	Specification
Standard	SMPTE259M-C, 270 Mbps, 525/625 component
Quantization	10 bits
Connector	BNC (IEC169-8)
Impedance	75Ω
Return loss	18 dB (typical) from 5 MHz to 270 MHz
Signal level	800 mV ± 10%
DC offset	0.0 ± 0.5 V
Rise/fall time	400 ps to 1500 ps (20% to 80%)
Overshoot	<10% of amplitude
Jitter	Timing: <0.2 UI; alignment: <0.2 UI

Table E-15. Composite Video Output Specifications

Item	Specification
Standard	• NTSC • PAL-B • PAL-M
Connector	BNC (IEC169-8)
Quantization	12 bits
Impedance	75Ω
Return loss	> 40 dB (0.1 MHz to 6 MHz)
Frequency response	±0.1 dB (0.1 MHz to 6 MHz)
DC offset	<0.0 ± 0.005 V
Differential gain	<0.5%
Differential phase	<0.5°
Y/C delay	<10 ns
Transient response	<0.5% K Factor
SNR	> 63 dB (0.1 MHz to 6 MHz)

Table E-16. Component Output Specifications

Item	Specification
Format	Betacam
Connector	BNC (IEC169-8)
Quantization	• Y: 12 bits • Cb: 10 bits • Cr: 10 bits
Impedance	75Ω
Return loss	> 40 dB (1 kHz to 6 MHz)
Frequency response	• Y: ±0.1 dB to 5.5 MHz • Pb/Pr: ±0.10 dB to 3.0 MHz
DC offset	<0.0 ± 5 mV
Relative delay	<±10 ns
SNR	> 63 dB

Table E-17. Streaming Output Specifications

Item	Specification
Video compression type	MPEG4
Profile	Simple Profile
Modes	Fixed Bit Rate Mode, VBR (Variable Bit Rate) Mode
Bit rate range control	User-selectable 200 Kb/s - 1 Mb/s
Frame rate (VBR)	30 fps / 25 fps
Frame rate (fixed)	As bit rate is lowered, frame rate is lowered
Audio compression type	AAC (Advanced Audio Coding) format
Profile	LC (Low Complexity)
Sample rate	48 K
Stereo bit rate (two channels)	64 Kbps

Table E-18. DVI Output Specifications

Item	Specification
Standard	• 1080i/59.94 • 1080i/50 • 720p/59.94 • 720p/50
Connector	DVI-D
Rise/fall times	75 ps to 0.4 UI (20% to 80%)
Level	1.0 V ± 0.2 V (differential, pk-to-pk)
Jitter	0.25 UI

Audio Specifications

Input

Table E-19. AES/DARS Input Specifications

Item	Specification
Balanced	
Standard	AES3
Type	Balanced, transformer coupled
Connector	2 female DB-26/DB-44 connectors with breakout cable
Sensitivity	<200 mV
Impedance	110Ω ± 20% (0.1 MHz to 6 MHz)
Common mode rejection	0 V to 7 V (0 kHz to 20 kHz)
Input audio rate	32 kHz to 96 kHz
Unbalanced	
Standard	AES3, SMPTE276M
Type	Unbalanced, AC coupled
Connector	BNC (IEC169-8)
Sensitivity	<100 mV
Impedance	75Ω
Return loss	> 25 dB, 0.1MHz to 6 MHz
Input audio rate	32 kHz to 108 kHz

Table E-20. Analog Audio Input Specifications

Item	Specification
Connector	Removable barrier strip
Input impedance	Jumper selectable with J5~J8 • Pin 2-3: 100 kΩ • Pin 1-2: 600 Ω
Input analog level	28 dBu to 16 dBu (adjustable by 2 dB increments)
CMRR	> 80 dB @ 60 Hz, typical
Linearity	<±0.5 dB (to -100 dBFS)
Frequency response	<±0.05 dB (20 Hz to 20 kHz), typical
THD	> 100 dB (@ -1 dBFS, 20 Hz to 20 KHz)
SNR	> 100 dB

Output

Table E-21. AES Output Specifications *(Continued)*

Item	Specification
Balanced	
Standard	AES3
Type	Balanced, transformer coupled
Connector	2 female DB-26/DB-44 connector with breakout cable
Signal level	4.0 V (typical pk-to-pk)
Impedance	110Ω ± 20% (0.1 MHz to 6 MHz)
Jitter	<± 4 ns, peak value
DC offset	0.0 ± 50 mV
Rise/fall time	5 ns to 30 ns (10% to 90%)
Unbalanced	
Standard	AES3, SMPTE276M
Type	Unbalanced, AC coupled

Table E-21. AES Output Specifications *(Continued)*

Item	Specification
Connector	BNC (IEC169-8)
Signal level	1.0 V ± 10% (pk-to-pk)
Impedance	75Ω
Return loss	> 25 dB, 0.1 MHz to 6 MHz
Jitter	<± 4 ns, peak value
DC offset	0.0 ± 50 mV
Rise/fall time	30 ns to 44 ns (10% to 90%)

Table E-22. Analog Audio Output Specifications

Item	Specification
Connector	Removable barrier strip
Output impedance	Jumper selectable with J1~J4, J9~J12 • Pin 2-3: 66Ω • Pin 1-2: 600Ω
Output analog level	28 dBu to 16 dBu (adjustable by 2 dB increments)
Linearity	<±0.5 dB (to -100 dBFS)
Frequency response	<±0.1dB (20 Hz to 20 kHz)
THD	<-87dB typical (@ -1 dBFS, 20 Hz to 20 KHz)
SNR	> 100 dB

I/O Specifications

Table E-23. Multi-I/O Specifications

Item	Specification
Composite output	• NTSC • PAL-B • SECAM • Sync
Component output	GBR
Quantization	8 bits all
GPI inputs	• Number: 2 • Internally pulled HIGH • External contact closure to ground to trigger
GPI outputs	• Number: 2 • TTL-compatible • 75Ω impedance • Sink 64 mA, source 32 mA
Connector	DB-26

Table E-24. Thumbnail Streaming Specifications

Item	Specification
Connector	RJ-45
Protocols	• CCS • SNMP • HTTP

Table E-25. V2A Specifications

Item	Specification
Measurement window	± 1.2 seconds between video and audio
Time to provide measurement	5 seconds
Measurement resolution	±2 video lines
Note The measurement result has 1.64 - 1.66ms delay for HD de- embedded audio and 1.28 - 1.3ms for SD de-embedded audio.	

Communication Specifications

Table E-26. RS-232/RS-422 Specifications

Item	Specification
Standard	Electrical specification EIA-232C
Connector	• DB-9 • 232/422 switchable • 422 termination can be selected from the menu

Hardware Specifications

Table E-27. Weight and Dimension Measurements

Item	Specification
Weight	• Fully loaded unit, no power cords: 11 lbs (4.9 kg) • Breakout cables (each): 2.5 lbs (1.1 kg)
Height	1RU, 1.75 in. (4.5 cm)
Width	19 in. (48.3 cm)
Depth (includes extruding knobs and BNCs)	21.5 in. (54.6 cm)

Power Consumption

Table E-28. Power Consumption by Individual Component

Component	Description	Power Consumption @ 115V AC
1	X85/X75 frame with mainboard	17.2 W
2	Local control panel	7.0 W
3	Blank front panel	5.3 W
4	X75OPT-HDUPG HDTV module	28.4 W
5	8-, 16-, or 32-channel audio submodule	• 19.7 W (8- and 16-channel) • 6.1 W (32-channel)
6	Analog video in submodule (A3D or PQM)	7.9 W
7	Streaming submodule	4.0W
8	Second power supply	Adds extra 5% to single power supply system configuration
9	X85OPT-HDUPG HDTV module	37.6 W

Table E-29. Power Consumption of Complete Packages

Systems Configuration	Individual Components	Description	Power Consumption @115VAC
X85 Models with X85OPT-HDUPG HDTV Module			
X85HD	1+2+9	X85 frame with mainboard, local control panel, and X85OPT-HDUPG HDTV submodule	62.2 W
X85HD-2PS	1+2+9+8	X85 frame with mainboard, local control panel, X85OPT-HDUPG HDTV submodule, and second power supply	64.2 W
X85HD-AV	1+2+9+5	X85 frame with mainboard, local control panel, X85OPT-HDUPG HDTV submodule, and 16-channel audio submodule	81.2 W
X85HD-AV-2PS	1+2+9+5+8	X85 frame with mainboard, local control panel, X85OPT-HDUPG HDTV submodule, 16-channel audio submodule, and second power supply	85.2 W
X85HD-LC	1+3+9	X85 frame with mainboard, blank front panel, and X85OPT-HDUPG HDTV submodule	60.2 W
X85HD-LC-2PS	1+3+9+8	X85 frame with mainboard, blank front panel, X85OPT-HDUPG HDTV submodule, and second power supply	62.2 W
X85HD-LCAV	1+3+9+5	X85 frame with mainboard, blank front panel, X85OPT-HDUPG HDTV submodule and 16-channel audio submodule	79.2 W
X85HD-LCAV-2PS	1+3+9+5+8	X85 frame with mainboard, blank front panel, X85OPT-HDUPG HDTV submodule, 16-channel audio submodule, and second power supply	83.2 W
X85-3G with Dual Channel Up, Down, Cross Conversion			
X85-3G	1+2+9	X85 frame with mainboard, local control panel, and X85OPT-HDUPG HDTV submodule with dual-channel .27/1.5/3.0 Gb/s conversion	62.2 W
X85-3G-LC	1+3+9	X85 frame with mainboard, blank front panel, and X85OPT-HDUPG HDTV submodule with dual-channel .27/1.5/3.0 Gb/s conversion	60.2 W

Table E-29. Power Consumption of Complete Packages

Systems Configuration	Individual Components	Description	Power Consumption @115VAC
X85-3G-AV	1+2+9+5	X85 frame with mainboard, local control panel, X85OPT-HDUPG HDTV submodule, and 16-channel audio submodule with dual-channel .27/1.5/3.0 Gb/s conversion	81.2 W
X85-3G-LCAV	1+3+9+5	X85 frame with mainboard, blank front panel, X85OPT-HDUPG HDTV submodule and 16-channel audio submodule with dual-channel .27/1.5/3.0 Gb/s conversion	79.2 W
X85-3G with Dual Channel Up, Down, Cross Conversion, Redundant PSU			
X85-3G-2PS	1+2+9+8	X85 frame with mainboard, local control panel, X85OPT-HDUPG HDTV submodule, and second power supply with dual-channel .27/1.5/3.0 Gb/s conversion	64.2 W
X85-3G-LC-2PS	1+3+9+8	X85 frame with mainboard, blank front panel, X85OPT-HDUPG HDTV submodule, and second power supply with dual-channel .27/1.5/3.0 Gb/s conversion	62.2 W
X85-3G-AV-2PS	1+2+9+5+8	X85 frame with mainboard, local control panel, X85OPT-HDUPG HDTV submodule, 16-channel audio submodule, and second power supply with dual-channel .27/1.5/3.0 Gb/s conversion	85.2 W
X85-3G-LCAV-2PS	1+3+9+5+8	X85 frame with mainboard, blank front panel, X85OPT-HDUPG HDTV submodule, 16-channel audio submodule, and second power supply with dual-channel .27/1.5/3.0 Gb/s conversion	83.2 W
X75HD Models with X75OPT-HDUPG HDTV Module			
X75HD	1+2+4	X75HD frame with mainboard, local control panel, and X75OPT-HDUPG HDTV submodule	53 W
X75HD-2PS	1+2+4+8	X75HD frame with mainboard, local control panel, X75OPT-HDUPG HDTV submodule, and second power supply	55 W

Table E-29. Power Consumption of Complete Packages

Systems Configuration	Individual Components	Description	Power Consumption @115VAC
X75HD-AV	1+2+4+5	X75HD frame with mainboard, local control panel, X75OPT-HDUPG HDTV submodule, and 16-channel audio submodule	72 W
X75HD-AV-2PS	1+2+4+5+8	X75HD frame with mainboard, local control panel, X75OPT-HDUPG HDTV submodule, 16-channel audio submodule, and second power supply	76 W
X75HD-LC	1+3+4	X75HD frame with mainboard, blank front panel, and X75OPT-HDUPG HDTV submodule	51 W
X75HD-LC-2PS	1+3+4+8	X75HD frame with mainboard, blank front panel, X75OPT-HDUPG HDTV submodule, and second power supply	53 W
X75HD-LCAV	1+3+4+5	X75HD frame with mainboard, blank front panel, X75OPT-HDUPG HDTV submodule and 16-channel audio submodule	70 W
X75HD-LCAV-2PS	1+3+4+5+8	X75HD frame with mainboard, blank front panel, X75OPT-HDUPG HDTV submodule, 16-channel audio submodule, and second power supply	74 W
X75SD Models			
X75SD	1+2	X75SD frame with mainboard, local control panel	24 W
X75SD-2PS	1+2+8	X75SD frame with mainboard, local control panel and second power supply	25 W
X75SD-AV	1+2+5	X75SD frame with mainboard, local control panel and 8-channel audio submodule	44 W
X75SD-AV-2PS	1+2+5+8	X75SD frame with mainboard, local control panel, 8-channel audio submodule and second power supply	46 W
X75SD-LC	1+3	X75SD frame with mainboard, blank front panel	22 W
X75SD-LC-2PS	1+3+8	X75SD frame with mainboard, blank front panel and second power supply	24 W

Table E-29. Power Consumption of Complete Packages

Systems Configuration	Individual Components	Description	Power Consumption @115VAC
X75SD-LCAV	1+3+5	X75SD frame with mainboard, blank front panel and 8-channel audio submodule	42 W
X75SD-LCAV-2PS	1+3+5+8	X75SD frame with mainboard, blank front panel, 8-channel audio submodule and second power supply	44 W
X75-DPS-575 Models			
X75-DPS-575	1+2+6	X75SD equivalent frame to DPS-575 with mainboard, local control panel and PQM analog video in submodule	32 W
X75-DPS-575AV	1+2+5+6	X75SD equivalent frame to DPS-575AV with mainboard, local control panel, PQM analog video in and 8-channel audio submodule	52 W
X75-DPS-575LC	1+3+6	X75SD equivalent frame to DPS-575LC with mainboard, blank front panel, and PQM analog video in submodule	30 W
X75-DPS-575LCAV	1+3+5+6	X75SD equivalent frame to DPS-575LCAV with mainboard, blank front panel, PQM analog video in and 8-channel audio submodule	50 W

X75 HD Conversion Capabilities

The X75HD module can convert any of the input signals and formats listed in Table E-30 to any of the specified output signals and formats. (The symbol **Y** indicates that this format conversion is supported.).

Table E-30. X75HD Supported Conversion Formats

		Outputs							
		486i/ 59.94	720p/ 59.94	1080i/ 59.94	1080p/ 23.98*	576i/ 50	720p/ 50	1080i/ 50	1080p/ 25
Input	480i/59.94	Y	Y	Y	Y2				
	720p/59.94	Y	Y	Y	Y2				
	1080i/59.94	Y	Y	Y	Y2				
	1080p/23.98	Y1	Y1	Y1	Y				
	1080psf/23.98	Y1	Y1	Y1	Y				
	576i/50					Y	Y	Y	Y
	720p/50					Y	Y	Y	Y
	1080i/50					Y	Y	Y	Y
	1080p/25					Y	Y	Y	Y

Y1 indicates that 2:3 cadence is used; Y2 indicates material with 3:2 cadence converted with no motion artifacts

X85 Conversion Capabilities

Table E-31. X85 Supported Conversion Formats

		Outputs										
		486i/ 59.94	**720p/ 59.94**	**1080i/ 59.94**	**1080p/ 23.98**	**1080psf/ 23.98**	**1080p/ 59.94**	**576i/ 50**	**720p/ 50**	**1080i/ 50**	**1080p/ 25**	**1080p/ 50**
Input	**486i/59.94**	Y	Y	Y	Y2	Future option	Y					
	720p/59.94	Y	Y	Y	Y2		Y					
	1080i/59.94	Y	Y	Y	Y2		Y					
	1080p/23.98	Y1	Y1	Y1	Y		Y1					
	1080psf/23.98	Y1	Y1	Y1	Y		Y1					
	1080p/59.94	Y	Y	Y	Y2		Y					
	576i/50							Y	Y	Y	Y	Y
	720p/50							Y	Y	Y	Y	Y
	1080i/50							Y	Y	Y	Y	Y
	1080p/25							Y	Y	Y	Y	Y
	1080p/50							Y	Y	Y	Y	Y

Y1 indicates that 2:3 cadence is used; Y2 indicates material with 3:2 cadence converted with no motion artifacts

X75 and X85 Video Propagation Delays

Propagation delays for the X85 and X75 vary according to a number of different variables. For information about specific delay times, see the *X85/X75 Propagation Delay Tables* found on the *X85/X75 System and Control Panel Documentation CD-ROM.*

X85/X75-RCP Specifications

Dimensions and Weight

Table E-32. Dimension and Weight Specifications

Item	Dimension
Height	1.75 in. (4.4 cm)
Width	19 in. (48.3 cm)
Mounting depth	Approximately 5 in. (13 cm)
Weight	2.5 lbs (1.1 kg)

Network Control

Table E-33. Network Control Specifications

Item	Specification
Connector	RJ-45
Protocol	EP, DCN over Ethernet
Ethernet	10/100 base-T

Power Consumption

Table E-34. Power Consumption Specifications

Item	Specification
Power consumption (control panel only)	Input power: 6 W max. at 100 to 240 VAC, 50/60 Hz

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